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This report describes activities, in its third year of operation, under the Federal program of technology transfer as provided by the State Technical Services Act of 1965. Field service programs were brought under way in 34 states and 1/4 of the states established formal regional programs. Congress extended authorizations under the State Technical Services Act for three more years. The Public Evaluation Committee conducted thorough investigations and submitted a preliminary report to the Secretary of Commerce. Forty-six states received matching grants for annual programs to provide such technical services as field counseling, reference and referral services, and educational programs; 20 Special Merit Programs, of regional or national significance, were funded. Effective working relationships with other government agencies concerned with technology transfer have been continued and enlarged. (Tables and maps are included; appendixes include program descriptions, publications, and lists of persons and institutions involved.) (nl)

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Office of
State Technical Services

ANNUAL REPORT
FISCAL YEAR
1968

U.S. DEPARTMENT OF COMMERCE
C. R. Smith, Secretary

John F. Kincaid, Assistant Secretary
for Science and Technology

Office of State Technical Services
Philip K. Reily, Director

AC 003 779

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THE SECRETARY OF COMMERCE
WASHINGTON, D.C. 20230

January 16, 1969

The President
The President of the Senate
The Speaker of the House of Representatives

Sirs:

I have the honor to transmit herewith the fiscal year 1968 annual report of the activities of the Office of State Technical Services as required by Section 14(b), Public Law 89-182, State Technical Services Act of 1965.

Respectfully yours,

C R Smith

C. R. Smith
Secretary of Commerce

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INTRODUCTION

The State Technical Services Act of 1965 became Public Law 89-182 when it was signed by President Lyndon B. Johnson in the East Room of the White House on September 14, 1965.

The preamble to the Legislation states . . .

> "An Act to promote commerce and encourage economic growth by supporting State and interstate programs to place the findings of science usefully in the hands of American enterprise."

The declaration of purpose continues . . .

> "Section 1, That Congress finds that wider diffusion and more effective application of science and technology in business, commerce, and industry are essential to the growth of the economy, to higher levels of employment, and to the competitive position of United States products in world markets. The Congress also finds that the benefits of federally financed research as well as other research, must be placed more effectively in the hands of American business, commerce and industrial establishments. The Congress further finds that the several States through cooperation with universities, communities, and industries can contribute significantly to these purposes by providing technical services designed to encourage a more effective application of science and technology to both new and established business, commerce, and industrial establishments. The Congress, therefore, declares that the purpose of this Act is to provide a national program of incentives and support for the several States individually and in cooperation with each other in their establishing and maintaining State and interstate technical service programs designed to achieve these ends."

This report describes activities under this Federal program of technology transfer for economic growth in its third year of operation.

During this year, the experience gained in earlier years became an important factor, and State and Federal programs were adjusted to take advantage of the new knowledge. The effectiveness of person-to-person contact as a technology-transfer mechanism—proved in State after State—brought field-service programs under way in thirty-four States. The success of inter-State cooperation induced fourteen States—one-quarter of the States and eligible territories—to establish formal regional technical service programs. And both of these clear trends are continuing.

The year was also one of review and evaluation. The Congress extended authorizations under the State Technical Services Act for three more years, after extensive hearings in the Senate and the House of Representatives. And the Public Evaluation Committee, called for under the Act, conducted thorough investigations and submitted a preliminary report to the Secretary of Commerce.

Most important, the year also saw continued growth in program activity under the State Technical Services Act. Forty-six States received matching grants for annual programs, and twenty matching grants for special programs were awarded.

The three-year commitment of Federal and State resources in the 50 States, the District of Columbia, Guam, Puerto Rico, and the Virgin Islands, is given in Appendix A. There it also is shown that the combined Federal and State funds totaled nearly $26.5 million.

Table I, below, provides a three-year summary of the Federal dollar amounts and number of grants in each of three categories awarded during fiscal years 1966, 1967, and 1968.

Table I.—Three-Year Tabulation of Grants by the Office of State Technical Services

Type of grant	Fiscal year 1966		Fiscal year 1967		Fiscal year 1968		Three-year totals	
	No.	Amount	No.	Amount	No.	Amount	No.	Amount
Planning grants	53	$1,307,101	43	$647,043	45	$781,992	141	$2,736,136
State program grants	24	1,608,269	41	3,827,956	46	4,453,008	111	9,889,233
Special program grants	3	109,629	16	506,940	20	594,999	39	1,211,568
Totals	80	3,024,999	100	4,981,939	111	5,829,999	291	13,836,937

THE PUBLIC EVALUATION COMMITTEE ON STATE TECHNICAL SERVICES

The State Technical Services Act, in Section 15, requires that:

> "Within three years from the date of enactment of this Act, the Secretary shall appoint a public committee, . . . (which) shall evaluate the significance and impact of the program under this Act and make recommendations concerning the program. . . ."

Secretary Trowbridge constituted the Public Evaluation Committee on State Technical Services in July 1967 under the chairmanship of former Congressman Carl Elliott of Alabama. The members are:

Myron A. Coler, New York
Robben W. Fleming, Michigan
Martin Goland, Texas
Paul Hinkle, West Virginia
Randall T. Klemme, Nebraska
Robert J. Seidl, Washington
Weston Vivian, Michigan
Matthew E. Welsh, Indiana
Randall M. Whaley, New York
Robert L. Williams, Michigan
Richard J. Woodward, California
Everett Zurn, Pennsylvania
Edward W. Bisone, Executive Secretary

After an organizational meeting and a series of individual visits by committee members to programs in their own and neighboring States, the Committee conducted hearings in five regions of the United States and heard testimony from twenty-two States and from the regional programs in New England and the Rocky Mountains.

On the basis of this extensive investigation, and following several working sessions, the Public Evaluation Committee issued an interim report on March 26, 1968, which included five recommendations, as follows:

> "The Department should seek an extension of the authorization of funds for the purpose of the State Technical Services Act for an additional three years. The level of authorization should be $30,000,000 for each of the three fiscal years."
>
> "The Department of Commerce and the Administration should make every effort possible to secure increases in the funds appropriated for the implementation of the State Technical Services Act."
>
> "The Act should be so administered as to encourage more regional or interstate programs."
>
> "The Secretary of Commerce, under the powers inherent in him in this Act, should appoint a national advisory committee to review the activities under this Act and make recommendation to him and the President on a continuing basis."
>
> "The Department of Commerce should make available and conduct a training program for State personnel engaged in program activities, that this program, in particular, be designed to provide field service representatives the necessary technical, business and economic skills to effectively carry out their tasks."

Furthermore, Chairman Elliott was invited to testify in the Senate on May 2 and in the House of Representatives on June 19. In both hearings, the Chairman's testimony was constructive, favorable to the State Technical Services program, and received with obvious interest by the Congress.

At year-end (June 1968), the Public Evaluation Committee had completed its investigations and was hard at work on the preparation of the final report to the Secretary of Commerce, due in November.

EXTENSION OF THE STATE TECHNICAL SERVICES ACT

The State Technical Services Act of 1965 authorized appropriations in fiscal years 1966, 1967, and 1968. It was necessary, therefore, for the Department of Commerce to seek an extension of authorizations to continue the program past June 30, 1968.

Reflecting the prevailing economic conditions, the Administration restricted its request to the Congress to an extension of only two years, with an authorization of $7 million in fiscal year 1969 and such amounts as may be needed in 1970.

Senator Magnuson introduced such a bill on March 27, 1968, and said:

> "I am happy to report that the objectives of the State Technical Services Act are being realized. When I introduced the State Technical Services bill in the 89th Congress, it was with the expectation that the level of utilization of scientific and technical knowledge by American business, particularly small- and medium-size business, could be raised by the program. This expectation is being fulfilled and the extension of the authorization of appropriations for the State Technical Services Act is in the interest of the economic well-being of the Nation."

Hearings of the Senate Committee on Commerce were held under the chairmanship of Senator Scott on May 2, 1968. Witnesses who appeared on behalf of extension included Dr. John F. Kincaid, Assistant Secretary of Commerce for Science and Technology; Philip K. Reily, Director of the Office of State Technical Services; Carl Elliott, Chairman of the Public Evaluation Committee; Dr. Arthur S. Adams and Dr. C. Brice Ratchford, representing the National Association of State Universities and Land-Grant Colleges; and Dr. Donald E. Marlowe, representing the National Society of Professional Engineers. At the conclusion of these hearings, the Committee on Commerce reported a bill (S.3245) which extended authorization for appropriations for three years through 1971, and this was passed by the Senate.

Congressman Staggers introduced into the House of Representatives a bill for an extension of one year at $7 million, and hearings of the House Committee on Interstate and Foreign Commerce were held under the chairmanship of Congressman Moss on June 19, 1968, who said:

> "I think that in this program, perhaps far more than most coming before this Committee, we could prove quite conclusively that a dollar invested . . . would yield in new revenues directly from business and from increased taxation from employees, far more than the amount invested."

With few exceptions, the House took testimony from the same witnesses who appeared in the Senate. After these hearings, the Committee on Interstate and Foreign Commerce also reported a bill (H.R. 16824) to extend authorization of appropriations for three years, and this was passed by the House of Representatives.

A minor difference between the House and Senate bills (the level of first-year authorization) was reconciled in conference, and a bill to extend authorizations under the State Technical Services Act for three years at $6.6 million in fiscal year 1969 and $10 million each in 1970 and 1971 was passed by both houses of Congress and sent to the White House, where it was signed into law by President Johnson on July 24, 1968.

This three-year extension—enacted in a period of stringent economy and in response to a restrained request by the Administration—can be regarded as recognition of early success of the State Technical Services program.

STATE PROGRAMS DIVISION

Section 10(b). From these amounts, the Secretary is authorized to make an annual payment to each designated agency, participating institution, or person authorized to receive payments in support of each approved technical services program. Maximum amounts which may be paid to the States under this subsection shall be fixed in accordance with regulations which the Secretary shall promulgate and publish in the Federal Register . . .

The State Programs Division of the Office of State Technical Services has broad responsibility for administering planning grants and annual program grants to the States in support of approved technical services plans and programs as provided for in the State Technical Services Act. This responsibility includes reviewing and evaluating State plans and programs, coordinating State programs at the national level, and establishing close personal contact with the State designated agencies to assist them in developing effective programs and achieving a firsthand knowledge of the operating programs in each of the participating States. Continuous efforts are made to keep the Office of State Technical Services administrative policies and procedures attuned to the needs and interests of the States with a view to reducing as much as possible the administrative burden imposed upon the State designated agencies and participating institutions.

For this purpose, a second Annual National Conference on State Technical Services was held in Washington, D.C., October 10 and 11, 1967. Highlights of the conference included comments by Dr. John F. Kincaid, Assistant Secretary of Commerce for Science and Technology, in which he called attention to the need to evaluate the effectiveness and progress of the State Technical Services program in this era of cost-benefits consciousness. Mr. Sumner Meyers, Institute of Public Administration, discussed a study of technology transfer conducted by the National Planning Association under the sponsorship of the National Science Foundation. Dr. Charles Kimball, president of the Midwest Research Institute, addressed the general subject of technology transfer and emphasized his belief that the technology transfer process is social and economic in form and purpose. Senator Jennings Randolph of West Virginia, Chairman of the Subcommittee on Science and Technology of the Senate Select Committee on Small Business, stressed the values of technology transfer in serving many industries well and providing new vigor to the development of small business and the less affluent areas of the Nation. The Honorable Alexander B. Trowbridge, then Secretary of Commerce, told the participants that largely through their energy, enthusiasm, and imagination, the State Technical Services program has the capability of helping the Nation achieve its goal of greater economic strength through the wide-spread application of the genius of American innovation.

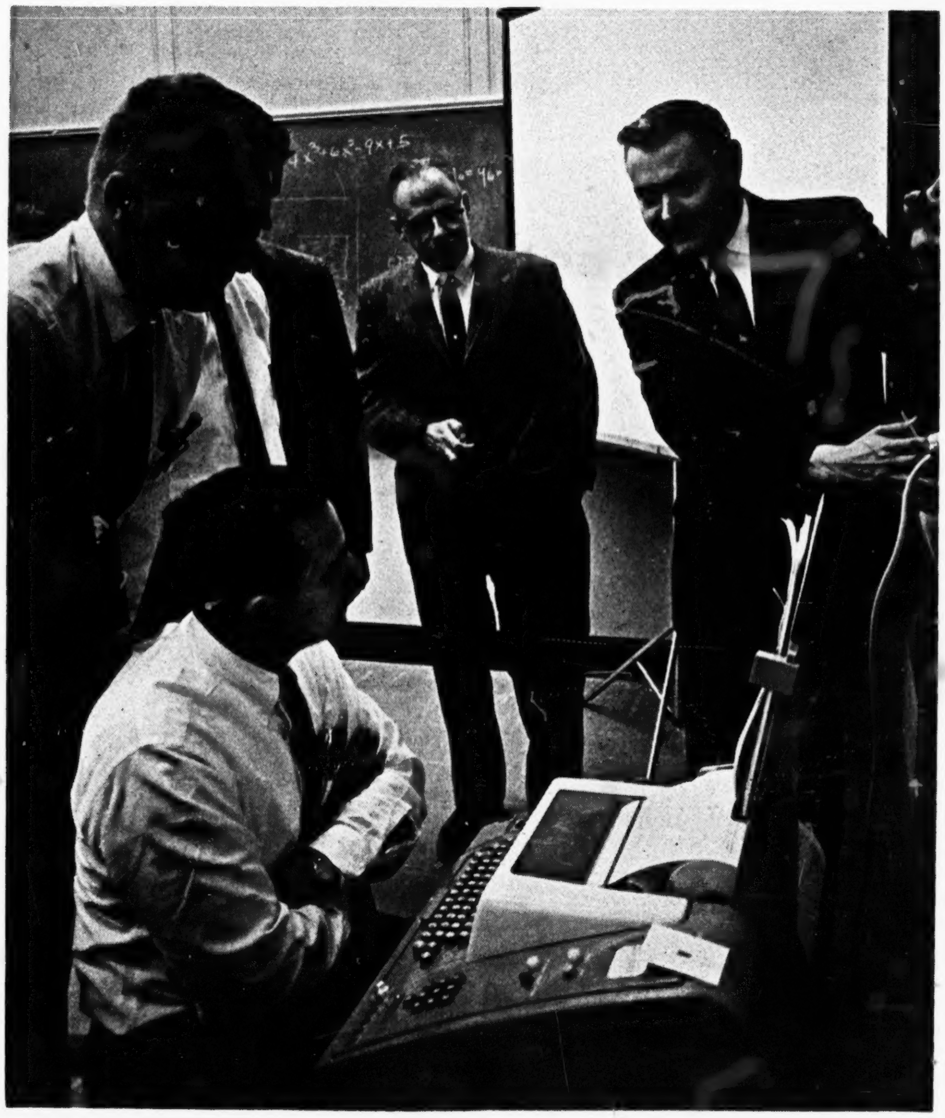
Working sessions of the conference included reports by the chairmen of the six State Technical Services Task Groups whose duties had been assigned at the National Conference on State Technical Services in December 1966. Each of these presentations were followed by discussion periods.

Bulletins and Memoranda of the Office of State Technical Services have been issued from time to time to announce policies and suggest guidelines for the administration, support, and operation of State Technical Services programs. The Office of State Technical Services has also published the State Technical Services Newsletter since April 1966. Now issued monthly, it is the prime medium through which information is exchanged with the States about their programs and activities, and news about the objectives and operations of State Technical Services programs is transmitted. Appendix B contains a current list of the Office of State Technical Services Bulletins, Memoranda, and Announcements, furnished to the States.

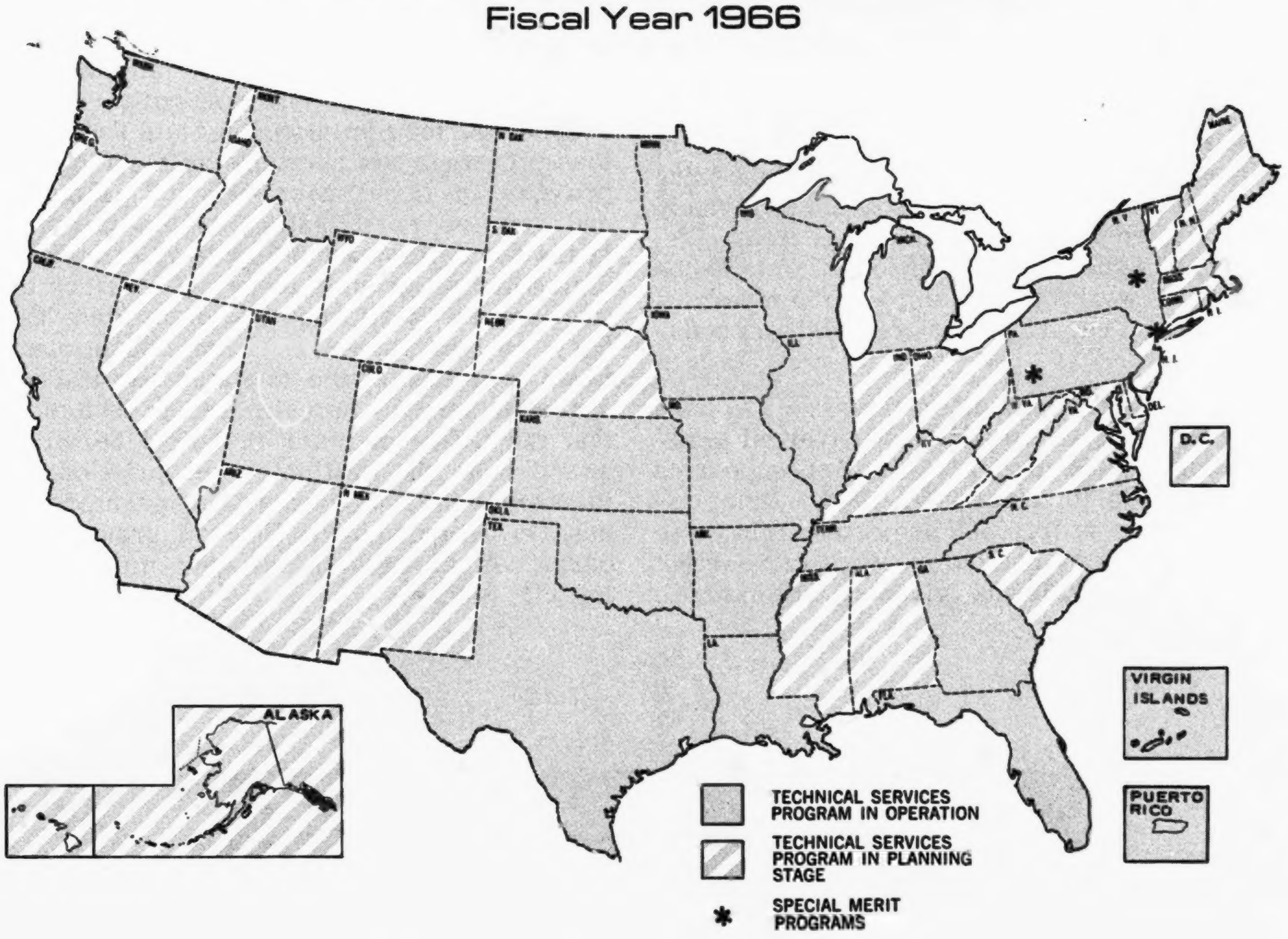
Table I indicates that consistent allocation of more than 80 percent (83.3 percent in fiscal year 1966, 81.4 percent in 1967, and 80.5 percent in 1968) of the annual appropriation to the Office of State Technical Services has been made directly to the States in the form of planning grants and annual program grants for technical services programs. For fiscal year 1968, planning grants and State program grants accounted for $5,235,000 out of the appropriation of $6.5 million. Planning grants totaling $781,992 were made to 45 States, and 46 States received annual technical services program grants totaling $4,453,008. This compares with 24 States receiving $1,608,270 in State program grants in fiscal year 1966 and 41 States receiving $3,827,956 in fiscal year 1967.

The maps on pages 6 and 7 illustrate the growth in participation by the States over the first three years of experience in this program. The organization within each of the States for purposes of authorizing, planning, reviewing, and administering its annual technical services program is given in Appendix F, wherein are listed the State chief executives, designated agency officials, State Technical Services working contacts, and the membership of the State Technical Services advisory councils.

Table II presents the number of projects in each of the several broad categories of technical services set forth in Section 2 of the Act, supported by Federal funds in fiscal year 1968. Brief descriptions of the nearly 600 projects within these broad categories of technical services carried out by 46 State programs are given in Appendix G. An index to the wide variety of technologies and the methods and techniques presented through those projects has been provided at the end of that listing. Appendix D lists the State agencies, colleges, universities, and nonprofit organizations responsible for administering State Technical Services programs and carrying out technical services projects in fiscal year 1968. This enthusiastic and growing participation during the past three years demonstrates the high level of interest in the States in a program of technical services to industry such as is afforded under the State Technical Services Act. Indeed, the total amount of matching funds requested by the 46 States was $6,066,531 or approximately 35 percent greater than the amount that the Office of State Technical Services could award from the available appropriation. In many instances, the States have demonstrated a willingness to overmatch the Federal grant in order to carry out the essential aspects of the program as initially planned.



STATE AND SPECIAL PROGRAMS,
Fiscal Year 1966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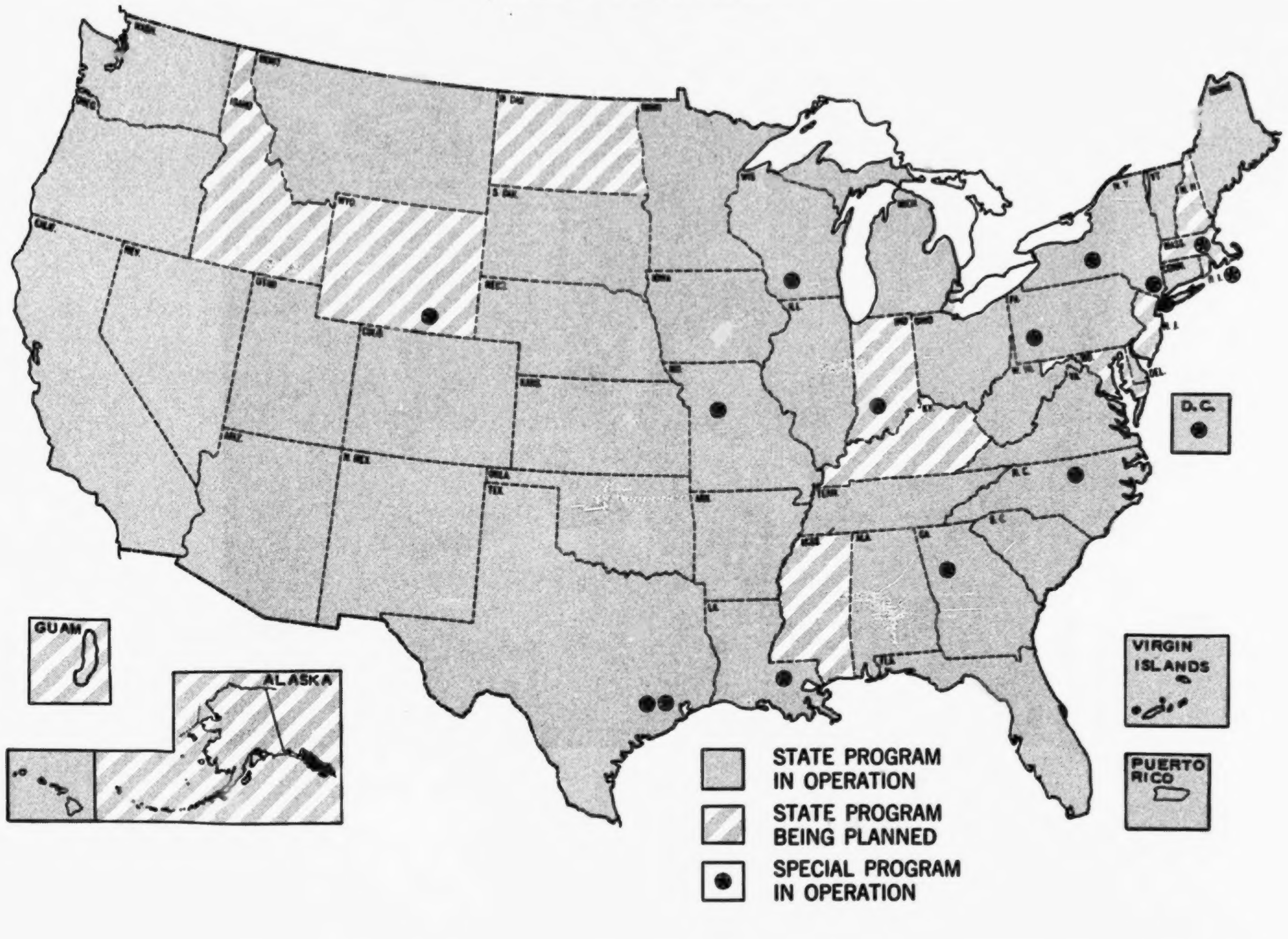
TECHNICAL SERVICES PROGRAM IN PLANNING STAGE
* SPECIAL MERIT PROGRAMS

STATE AND SPECIAL PROGRAMS,
Fiscal Year 1967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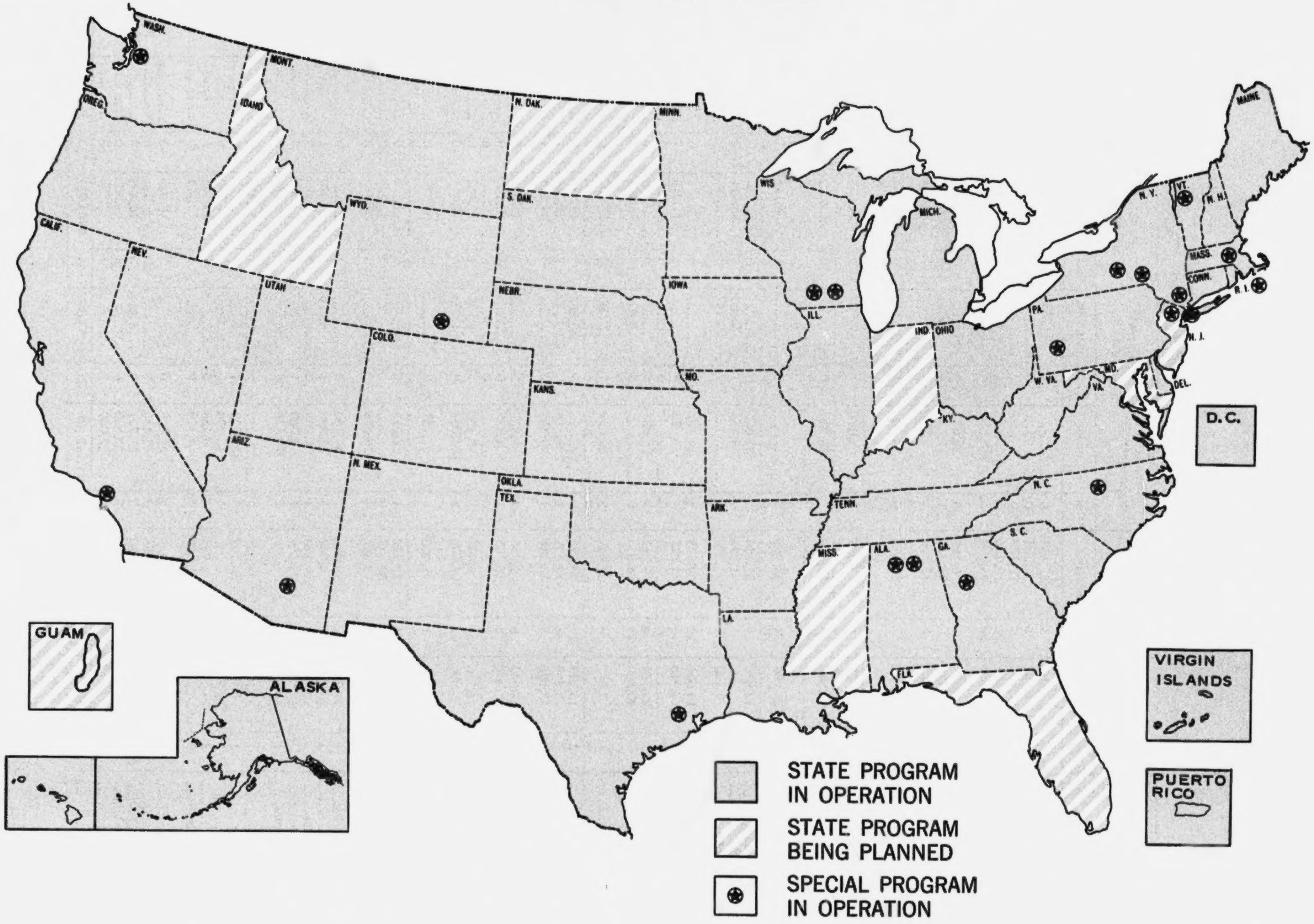
STATE AND SPECIAL PROGRAMS,

Fiscal Year 1968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S. DAK.
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MICH.
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N. H.
MAINE
MASS.
CONN.
R. I.
D. C.
GUAM
ALASKA
VIRGIN ISLANDS
PUERTO RICO
▢ STATE PROGRAM IN OPERATION
▨ STATE PROGRAM BEING PLANNED
⊛ SPECIAL PROGRAM IN OPERATION

Table II.—OSTS Support by Broad Categories of Approved Technical Service Projects for Fiscal Year 1968

State	Administration		Seminars, conferences courses, etc.		Information dissemination services		Referral services		Field services		Demonstrations		Total	
	No.	Amount	No.	Amount	No.	Amount	No.	Amount	No.	Amount	No.	Amount	No.	Amount
Alabama	1	$6,800	8	$82,450	0	....	1	$3,000	0	....	0	....	10	$92,250
Alaska	1	9,480	1	3,360	0	....	0	....	1	$25,260	0	....	3	38,100
Arizona	1	11,900	9	12,770	0	....	0	....	1	32,530	0	....	11	57,200
Arkansas	1	4,290	12	29,034	0	....	1	4,660	1	27,416	0	....	15	65,400
California	1	16,962	50	64,960	5	$218,851	0	....	0	....	0	....	57	300,773
Colorado	1	5,000	3	6,729	3	23,232	0	....	3	33,503	0	....	10	68,464
Connecticut	2	7,995	4	50,240	2	17,833	1	11,940	1	15,575	0	....	10	103,583
Delaware	0	....	1	15,629	1	5,262	0	....	1	22,501	0	....	3	43,392
District of Columbia	1	3,774	7	30,694	0	....	1	16,492	0	....	0	....	9	50,890
Florida	0	....	0	....	0	....	0	....	0	....	0	....	0	....
Georgia	1	6,177	4	27,019	1	1,011	1	3,500	3	54,633	1	$5,160	11	97,500
Guam	0	....	0	....	0	....	0	....	0	....	0	....	0	....
Hawaii	1	3,345	8	20,000	2	23,300	0	....	0	....	0	....	11	46,645
Idaho	0	....	0	....	0	....	0	....	0	....	0	....	0	....
Illinois	1	26,280	4	60,965	0	....	0	....	1	8,143	1	104,612	7	200,000
Indiana	0	....	0	....	0	....	0	....	0	....	0	....	0	....
Iowa	1	12,870	25	51,100	3	21,030	0	....	0	....	0	....	29	85,000
Kansas	1	....	5	11,789	2	8,438	1	5,862	3	58,911	0	....	12	85,000
Kentucky	1	10,100	2	21,508	0	....	2	63,442	0	....	0	....	5	95,050
Louisiana	1	10,000	22	59,693	1	19,141	0	....	0	....	0	....	24	88,834
Maine	2	10,915	6	11,825	1	7,620	0	....	1	11,910	1	11,100	11	53,370
Maryland	0	....	0	....	0	....	0	....	0	....	0	....	0	....
Massachusetts	3	20,746	4	19,717	2	21,888	0	....	0	....	0	....	9	62,351
Michigan	1	20,000	24	54,565	0	....	2	3,405	10	75,240	1	7,590	38	160,800
Minnesota	1	7,057	4	27,645	2	29,029	1	1,000	2	67,160	0	....	10	131,891
Mississippi	0	....	0	....	0	....	0	....	0	....	0	....	0	....
Missouri	3	13,273	19	58,326	0	....	5	46,562	3	13,739	0	....	30	131,900
Montana	1	3,366	8	17,671	1	6,518	0	....	2	22,285	1	1,107	12	50,947
Nebraska	3	11,563	8	8,708	1	10,210	0	....	3	44,519	1	5,000	16	80,000
Nevada	2	12,342	6	2,738	2	8,877	0	....	1	15,443	0	....	11	39,400
New Hampshire	2	7,300	8	18,775	1	9,232	0	....	1	10,148	0	....	12	45,455
New Jersey	0	....	0	....	0	....	0	....	0	....	0	....	0	....
New Mexico	1	14,713	11	9,987	1	5,450	1	2,808	1	17,712	0	....	15	50,670
New York	1	7,000	12	104,603	15	164,002	9	56,593	6	22,802	0	....	43	355,000
North Carolina	1	26,261	1	5,000	3	37,781	0	....	1	60,729	0	....	6	129,771
North Dakota	0	....	0	....	0	....	0	....	0	....	0	....	0	....
Ohio	1	17,790	14	19,942	4	32,292	8	143,759	0	....	0	....	27	213,783
Oklahoma	1	10,527	21	30,547	0	....	0	....	3	33,926	0	....	25	75,000
Oregon	1	3,372	1	5,367	4	26,676	0	....	3	32,785	0	....	9	68,200
Pennsylvania	1	17,230	4	39,985	7	149,160	0	....	0	....	0	....	12	206,375
Puerto Rico	2	20,400	5	4,800	1	12,000	1	5,076	1	41,670	1	1,054	11	85,000
Rhode Island	2	10,666	8	20,170	1	1,700	0	....	3	21,524	0	....	14	54,060
South Carolina	2	10,000	2	32,809	1	6,000	1	3,000	1	20,500	0	....	7	72,309
South Dakota	1	18,636	0	....	2	10,428	0	....	1	7,637	0	....	4	36,701
Tennessee	1	13,800	32	48,086	0	....	0	....	1	34,450	0	....	34	96,336
Texas	1	6,750	5	50,192	3	107,833	1	26,552	0	....	0	....	10	191,327
Utah	1	22,700	6	....	1	13,100	0	....	1	21,500	0	....	9	57,300
Vermont	2	11,727	3	8,944	1	8,758	0	....	1	10,463	1	22,981	8	62,873
Virgin Islands	0	....	4	15,578	1	4,110	0	....	1	3,172	0	....	6	22,860
Virginia	1	14,490	9	14,848	2	22,623	0	....	1	48,039	0	....	13	100,000
Washington	1	2,000	23	43,068	7	43,480	0	....	0	....	0	....	31	88,548
West Virginia	1	4,021	2	2,280	3	21,721	2	5,464	3	26,439	0	....	11	59,925
Wisconsin	1	17,500	62	28,265	2	37,800	0	....	1	34,000	0	....	66	117,565
Wyoming	1	7,173	5	8,264	1	12,000	0	....	1	7,773	0	....	8	35,210
Totals	58	$498,291	482	$1,260,645	90	$1,148,386	39	$403,045	68	$984,037	8	$158,604	745	$4,453,008

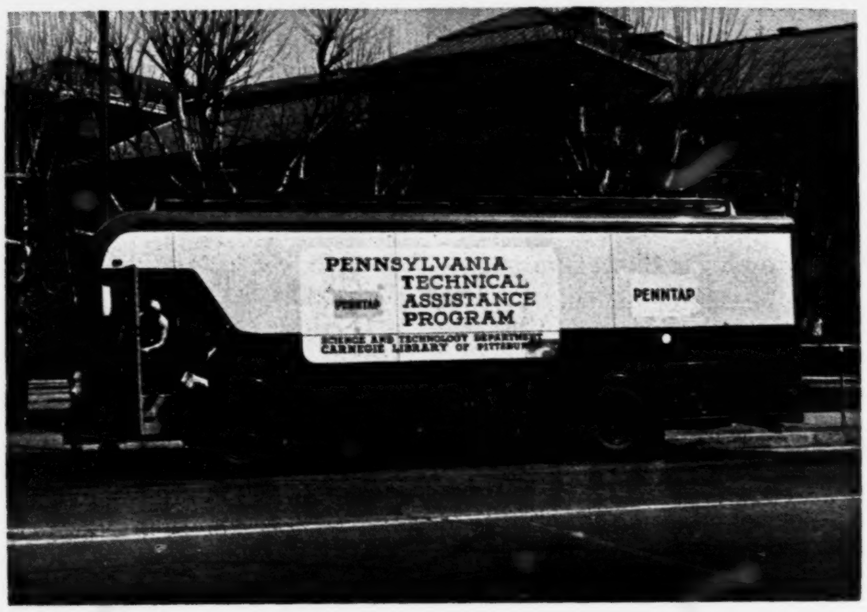
STATE TECHNICAL SERVICES ACROSS THE NATION

As was the case last year, the pressing need in most State programs is for a sufficient financial base to permit continuity of commitments to professional staffs for field service projects, information dissemination centers, and referral operations. Continuing education projects, such as conferences, workshops, and seminars, are less vulnerable because long-term commitments are not normally required to develop and execute such activities. The same may not be said for a field service project, a technical information activity, or a referral service that must be staffed on a continuing and full-time basis to be effective.

Person-to-person contacts continue to be the most effective method evolved to date for accomplishing technology transfer. This method is greatly dependent upon the development of field service personnel skilled in industrial know-how, knowledgeable about many sources of technical information and expertise, and readily capable of establishing rapport with the business community. Increasingly, State programs are placing emphasis on the field service effort. Other facets of the overall technical services program will assume a supporting role to meet specific needs identified through this direct contact with industry.

Another encouraging development in State programs is a growing interest in cooperative regional programs. In addition to their individual State programs, the six New England States of Vermont, New Hampshire, Connecticut, Massachusetts, Maine, and Rhode Island agreed to participate in two regional projects, "Technology Implementation of the Entrepreneurial Venture Capital Interface," and a series of four regional workshops on new printing technology, funded in part by a special merit grant. Next year, the New England regional program effort will be formalized and expanded to include possibly six regional projects. Also seven Rocky Mountain States and Nevada have been involved in preliminary planning for several regional projects.

One benefit that cannot be measured in terms of the number of companies served, demonstrations given, or other comparative yardsticks, is the increasing recognition and stature of the State designated agencies and technical services programs across the Nation. In many States, progress being made under the State Technical Services Act of 1965 is focusing increasing attention on the benefits of science and technology in strengthening and improving American business and industry. Brief descriptions of State Technical Services activities or singular projects in each of the States are presented in the following listing:


PENNSYLVANIA
TECHNICAL
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PENNTAP
SCIENCE AND TECHNOLOGY DEPARTMENT
CARNEGIE LIBRARY OF PITTSBURGH
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ALABAMA.—Technical services for Alabama include a referral service of scientific and technological expertise, a technical film library service, a technical information dissemination service, and a series of short courses, seminars, and workshops for the State's industries. Major services involve projects to provide technical information to the apparel industry and new technology applications in the metal and clay products manufacturing plants. A series of 30 one-half hour television programs is being continued to update plant and electrical engineers in industry on the design, installation, service, and maintenance of sophisticated electrical systems employing the latest solid-state devices. A series of intensive short courses will also be given for managers of Alabama's small and medium sized industries on the application and use of modern management science techniques for controlling and allocating resources in an optimum manner.

ALASKA.—Industry in Alaska is made up of a small number of diversified companies and many small businesses that have broad interstate and international operations. The majority of these firms are using outdated and inefficient methods. The first annual program, implemented during fiscal year 1968, provided technical services designed for a wider and more effective use of science and technology by Alaska commerce and industry. Other objectives of the program were to create an awareness of the need for industrial modernization and to illustrate the changing nature of the resources of the State. To accomplish these objectives, a field technical services program was established within the Division of Industrial Development of the Alaska Department of Economic Development. Conferences were also held to inform industries of services available through the State Technical Services program.

ARIZONA.—Technical services in Arizona under State Technical Services support are for the sole purpose of assisting Arizona business and industrial firms to become more efficient, productive and profitable through the application of technology. Educational services covered managerial skills for engineers, solid wastes, soil and rock mechanics, roads and streets, computer skills, graphic arts, and concrete technology. Information services, referral services and field services, also included in the overall program, are providing increasingly large numbers of companies with technical information and assistance in identifying and solving specific problems through referrals to expertise. These services represent the critical growing edge and the potentially most beneficial activities in the Arizona program being implemented through three universities on behalf of economic growth in Arizona.

ARKANSAS.—A series of educational seminars, workshops and conferences, conducted by the University of Arkansas, covered a broad spectrum of technologically based subjects for the benefit of Arkansas businessmen. These included courses in applied industrial statistics, techniques of plant layout, inspection and quality control, computer application, industrial applications of new synthetic materials, matrix analysis of structures, critical path method, foundation engineering, non-destructive testing for industrial quality control, industrial safety engineering, and modern techniques in welding. The educational activities were complemented by field, information and referral services designed to assist the businessman in identifying and defining technical problems and to recommend sources to which the businessman may refer for solutions, and to encourage more widespread utilization of technological and scientific information and techniques in problem solutions.

CALIFORNIA.—Community television of Southern California, KCET, Channel 28, Los Angeles, California, has been producing and presenting R&D REVIEW, a series of 39 one-hour educational television programs and INNOVATIONS, a series of 39 half-hour programs. These programs are being shown on educational television stations in California and in 15 other States and Washington, D.C., through the "BONUS Circulation" capabilities on NET. The audiences for these programs have been estimated in the tens of thousands for each of the major city outlets. The R&D REVIEW series is devoted to aerospace and advanced technologies, state-of-the-art reviews, re-broadcasts of technical society meetings, and foreign technology reports. The INNOVATIONS series is devoted to specific products and processes having the potential for more immediate commercial application.

COLORADO.—The program of technical services in Colorado consists of a series of interrelated activities, each providing a particular type of technical service to business, commerce, and industry in the State. Educational services are rendered through seminars and short courses. Also included are field and reference services, an industrial newsletter and preparation of an inventory of technological expertise. The Colorado School of Mines, Colorado State University, University of Colorado and University of Denver are participating institutions. Technical courses in analytical and testing techniques for the mineral industry and production scheduling and control were offered to benefit the business community. Graduate level courses in engineering and scientific fields were presented through video tape on a "not-for-credit" basis at selected industrial locations.

CONNECTICUT.—Connecticut is working with frontier technologies that offer growth potential for Connecticut industry, including the identification of major technological changes that will affect the metal working industry during the next decade. A field liaison and technical referral service has proven to be an effective means of assisting business in the application of new technology. Educational television is being employed to disseminate programs on available technical information services, materials research results, and other technology-oriented subjects. A technical information center on the joining and coating of materials is being developed as well as seminars to identify fields offering growth and product diversification opportunities for Connecticut industry. The linking of the State Technical Services program with other activities of the Connecticut Research Commission is providing a unique combination of scientific and technological resources to advance Connecticut industry.

DELAWARE.—The Delaware State Technical Services has initiated self-supporting, two-year technical certificate programs at the University of Delaware. Included are the subject areas of plastics technology and computers. There has been great success in solving industry problems of a technical nature through a field service to aid in identifying and defining problems and indicating applicable information sources. Especially noteworthy are examples of assistance to the plastics industry and the extraction of minerals from ore. These contribute to growth, diversification and improved operations in industry. A technical information service is being operated to disseminate scientific and technological results to management and supervisory engineers in industry. Technical education projects presented include a technology of construction conference, a technology utilization workshop for small firms, pollution control seminars, and current technology seminar for engineers.

DISTRICT OF COLUMBIA.—In the District, six universities and four non-profit organizations are actively participating in the State Technical Services program. Workshops and seminars were conducted for an audience of professional structural engineers, small builders, construction superintendents and engineers, architects, contractors, and bio-medical scientists. The educational program included the subject areas of structural analysis by computer methods, critical path method, and rehabilitation of housing. Through a project with the Board of Trade, a directory of 8,000 scientists and engineers in the Washington area was published to provide a low cost referral service that identifies local sources of expertise in the physical and applied sciences, engineering and mathematics. Ten newsletters were published to keep industry aware of available technological assistance.

FLORIDA.—Florida participated in the State Technical Services program during fiscal years 1966 and 1967. However, the inability of the State and its institutions to provide matching funds in fiscal year 1968 prevented a continuation of the technical services program. The level of technical services provided in Florida doubled between fiscal years 1966 and 1967 in response to the needs of business and industry and their readiness to cooperate in this Federal State program. Further increases had been anticipated for fiscal year 1968. Florida, under the 1967 program, still has an active project on Florida Fisheries Industries at the University of Miami. The economic growth of Florida's fishing industry has lagged, caused in part by lack of knowledge of new technological developments and the need for modern production methods. This State Technical Services project is helping to remedy these deficiencies. In fiscal year 1968, several other 1967 projects in field services, information programs and educational courses were completed.

GEORGIA.—Georgia has a comprehensive program of technical services to industry based on four broad project areas: (1) information services include dissemination of the latest findings on fire retardant coatings and their applicability in furniture plants, and a current register of scientific and engineering manpower, (2) field services encompass a technical information transfer service for all Georgia business and industry, the introduction of computer technology in business, and the application of finger jointing technology to flooring products, (3) educational projects are on the design and use of laminated wood construction systems, technical processes and layout of machinery operations, modern quantitative techniques, and the use of hot melt adhesives in furniture assembly, (4) a demonstration project involves the application of OR methods to saw milling. Georgia also has a special merit project for the mobile home industry.

GUAM.—Through a legislative amendment passed in 1967, the Territory of Guam was included in the State Technical Services Act. Under planning grants, work was begun on the preparation of a five-year plan and Guam's first annual technical services program. The five-year plan is expected to be submitted for approval, along with an annual program for fiscal year 1969, near the end of calendar year 1968. Activities carried out under the planning grants have included identification of needs, establishment of priorities, relation of needs and priorities to the total economic situation of Guam, and the development of procedures and methods for attacking specific problems. The purpose of the State Technical Services program in Guam is to improve the civilian sector of the economy so that a better balance will be achieved between the military and civilian economic sectors.

HAWAII.—The Department of Planning and Economic Development is the agency responsible for planning and administering the program of technical services in Hawaii. An educational program was instituted to alert the business and industry of Hawaii to the availability of new technology, to upgrade worker productivity, and to stimulate the greater use of advanced technology. A technological information center was established to assist Hawaii business and industry in the recognition and formulation of problems that are hindering their growth and to provide selected scientific and technical information to assist in the solution of their problems. An information, reference and bibliographic service was implemented to provide small and medium sized businesses and industries with information on new scientific and technical knowledge in the physical, biological, social and computer sciences.

IDAHO.—Efforts concerning State Technical Services have been devoted to the completion of the five-year plan and an annual State Technical Services program. This work has included a study of the resources and economy of the State in order to determine those areas where modern scientific and technological information could be applied in the most effective manner. Governor Samuelson changed the designated agency to the Office of Idaho Continuing Education. Under the new designated agency, the five-year plan for Idaho was completed and approved by OSTS. An annual program for fiscal year 1969 is in final stages of preparation and selection of an Advisory Council is underway. Submission of Idaho's first annual program is expected in the near future. Idaho has also participated with the seven other Rocky Mountain States in planning regional technical services activities that can be conducted more effectively on a cooperative multistate basis.

ILLINOIS.—Technical services in Illinois included the continued development and expansion of a project to demonstrate the feasibility of using a computer in the construction industry on a time-shared basis. Company participation and indications of direct cost savings continue to grow. Another project showing indications of direct cost savings is a comprehensive program of technical services and in-plant visits to aid the secondary wood-using industries. This effort is attempting to upgrade the technical competence and economic level of some 800 Illinois firms. Other projects include the application of photogrammetric measurements in quality control, demonstration of methods for test, evaluation and treatment of industrial wastes, application of numerical control through auto-instructional materials and computer applications in engineering and management systems analysis for small and medium sized firms.

INDIANA.—The Governor appointed the Board of Trustees for the Indiana Educational Services Foundation, and designated this Foundation as the designated agency for the State Technical Services Act. The Foundation was created as a nonprofit agency and instrument of the State to prepare, coordinate and administer both the State Technical Services Act of 1965 and Title I of the Higher Education Act of 1965. The Board of Trustees of the Foundation consists of 18 distinguished citizens of Indiana, and represents broad educational, business, industrial and labor interests. The Board has elected its officers and has appointed an Advisory Council as required by the Act. The Board has been active in making plans for a five-year plan and an annual program for full participation in the State Technical Services program.

IOWA.—Iowa has been at the forefront among the States in commitment of its own resources to the technological advance of its industry. Iowa continues to expand the range and scope of the activities provided through the State Technical Services program. During fiscal year 1968, some 29 separate seminars, short courses and conferences were conducted to aid business, industry and commerce within the State. In addition, a comprehensive information dissemination program has been expanded, and the computer-based information selection service continues to supply technical reports and documents to firms on a tailored basis. An active field services program covering the entire state complements the State Technical Services activities and aids in dissemination of technical assistance to all firms both large and small. A number of management related projects are conducted to aid in the application and utilization of technical information.

KANSAS.—During fiscal year 1968, the technical services program in Kansas underwent a significant change. The regional field office concept was scrapped in favor of a state-wide network of liaison representatives which pairs a campus expert with a company counterpart. Established as a link between campus and company, the liaison program serves an important role in keeping university and industry personnel up to date, and provides a direct person-to-person interaction on all technical problems. In addition to the liaison representatives, a comprehensive program of education and information services has been developed and expanded. Projects include a field service program for the printing industry, seminars in the field or soil engineering and foundation design, courses for small firms in metal fabrication and processing, workshops on the utilization of EDP equipment for small manufacturers and expansion of technical services in other areas.

KENTUCKY.—Fiscal year 1968 was the first year of participation by Kentucky in the State Technical Services program, and the indications are that the program is highly successful. The technical services provided include an information and analysis center to profile the technological needs of small and medium sized business and establish an information processing system to encourage these businesses to seek out and utilize new technology. In addition, a technical information center was established in the greater Louisville area to serve the growing needs of its business and industry. Other projects include closed circuit television conferences on advanced engineering technology and the application to industrial problems, and workshops on recent advances in land surveying, including aerial photography and computer applications.

LOUISIANA.—The State Technical Services program in Louisiana included 16 symposia and a series of workshops designed to present to business and industry the scientific and technological information needed in selective areas to assist in their economic growth. These activities were conducted by three educational institutions. The program also included a field services project to provide in-plant conferences to identify and assist in the solution of technologically based problems. To assist the commerce and industry in Louisiana to meet the challenge of a vigorous and competitive economy, the program included the publication of 11 State Technical Services papers, the development of a directory of expertise in scientific and technical disciplines, and the planning and partial implementation of a technical information center to serve the technical needs of small business and industries.

MAINE.—The Maine State Technical Services Program is providing highly successful seminars and workshops on technological innovation in such subjects as structural steel design, ultimate-strength design of reinforced concrete, industrial waste treatment, foundation design, hydrology, critical path method, and engineering applications of numerical analysis. The latest technological advances are now being communicated to over 4,000 businesses and individuals through a technical information system, field liaison service, and courses such as dry kiln operation, corrosion, use of electronic instruments, and computer applications in mechanical engineering design. A demonstration project on the use of modern computerized cost accounting systems for small business is leading to a breakthrough in solving persistent problems of small firms in knowing what their financial situation really is in time to make key decisions. An added aid to small business will be a series of three television programs on the application of statistical analysis in making business decisions.

MARYLAND.—The five-year plan highlights the need to incorporate the latest scientific and technical developments in the products and operations of firms throughout the State. The plan also calls attention to the need for R&D firms in the State to upgrade the management and technical skills and potentials of engineers and scientists moving up to management positions, especially in the areas of scientific management and the use of the latest available technical information for company growth. The initial annual program was prepared for fiscal year 1968 but State budget exigencies prevented its implementation. A proposed project that may well be a model for other States was the participation of the Maryland Academy of Sciences in sponsoring educational services to make available to Maryland industry the latest findings and economic opportunities in science and technology.

MASSACHUSETTS.—The Massachusetts five-year plan sets far reaching goals for the State Technical Services program and the economy of the Commonwealth to attain. Progress is well underway to achieve the goals through the initial program. An institute on innovative technology for the residential rehabilitation industry and a conference on the latest developments in materials, materials processing, and manufacturing have been scheduled. A technical guidance center for industrial water pollution control has been established. The University of Massachusetts is providing a counseling service to solve technical problems of industry. An industrial innovation conference will be held to acquaint Massachusetts industry with latest science and technology services. An informative newsletter is issued to provide industry with new technology that is applicable to Massachusetts industry.

MICHIGAN.—Technical services in Michigan are coordinated by the State Technical Services Program System which provides a statewide network for information dissemination, referral services and in-plant technical assistance through a field liaison representative at each of the State supported institutions. Each field director is also responsible for determining the needs of local industry for special educational seminars and workshops, and for the subsequent planning and administration of these activities. Typical projects planned and conducted by the State Technical Services Program directors include CPM for the construction industry, flammability of polymers, cold-type setting in printing, value analysis workshop, wear and abrasion resistance of plastics, new welding techniques for small firms, industrial air pollution, wood technology and forest inventory techniques, and various engineering application conferences. The program includes, in addition, a directory of Michigan industrial research laboratories and a bibliography of precast concrete products.

MINNESOTA.—Minnesota has expanded its Technical Services Agent Corps to a total of five experts and specialists in several fields, including a systems management specialist to meet the growing needs of business and industry in solving management related problems. The team consists of a food process engineer, a food microbiologist, a technology transfer engineer, and specialists in systems management and forest products utilization. Other program activities include the publication of a state-wide newsletter, continuing effort in identifying and cataloging industrial problems requiring technical information for solution and a technical information and referral service. In addition to these direct services, the program includes a number of educational activities and conferences on such topics as noise and vibration control, organic coatings for corrosion control, new material developments, and industrial application and use of technical instrumentation.

MISSISSIPPI.—The State of Mississippi has received approval of its five-year plan as submitted in February 1967. Although Mississippi has indicated an interest in the program and has stated that it would submit a revised annual technical services program, it has not as yet done so. The State of Mississippi recognized the existence of a critical need for stimulating business and industry within the State to become more efficient, productive, and profitable. The State has taken several important steps to meet this need, including the establishment of the Mississippi Research and Development Center. This Center is the agency designated by the Governor to plan, administer and coordinate the technical services program within the State. The Mississippi Research and Development Center has funds provided by its initial planning grant to prepare for participation in the State Technical Services program.

MISSOURI.—The technical services program in Missouri was expanded and improved during fiscal year 1968. Increased emphasis was placed on the development of a comprehensive state-wide field services program, including specialized services for mining and chemical industries. An experimental project of specialized technical counselling for small and medium sized firms was also instituted. In addition to field services, a strong information and referral program has been further expanded to include an information specialist on the staff of Linda Hall Library, one of the nation's outstanding technical libraries. A variety of special technical courses, designed to appeal to the technical, managerial and business representative, are also part of the State's efforts in bolstering industrial capabilities in the useful application of science and technology. An innovation in providing educational services through State Technical Services is the certificate program in systems analysis and data processing.

MONTANA.—Technical assistance and services have been provided to fill the technological gap experienced by many small and medium-sized firms and to improve the operational efficiency of Montana industries. The publication of the Engineering Research and Development Report pointed out to Montana's businessmen the potential industrial application of the research. A field visitation service to the mining industry assisted small operators in applying the latest research and innovations in machinery, equipment and mining methods. A directory of expertise in the scientific and engineering fields was prepared and published. A specialized field service for the chemical processing industry was implemented to introduce new equipment and process control and to assist the industry in combating air and water pollution. A series of workshops, seminars and demonstrations introduced new technology in selected fields to business and industry.

NEBRASKA.—The technical services program in Nebraska provides the organizational framework and coordinated state-wide system necessary for placing the results of science and technology in the hands of business, commerce, and industry in the state and converting these results to useful purposes. Activities conducted included expansion of an information dissemination program and a field service and counseling network, and the conduct of a number of seminars and conferences designed to effect a broader utilization of science and technology in all sectors of the economy of Nebraska. Specialized services were also conducted for small agricultural machinery manufacturers, and for consultants, engineers, and others in the transportation and related industries. A new pilot demonstration project was also established to show the application of the critical path method for planning, scheduling and control of construction projects.

NEVADA.—Nevada's State Technical Services operations were reorganized and the administering agency was renamed "Industrial Extension Service." The publication of a monthly newsletter was implemented to announce technical service activities to businessmen in conjunction with a continuing public relations project designed to improve timing and to publicize educational projects and other services available to business and industry under State Technical Services. The field services project continued to disseminate technical information and to assist both business men and the mining industry in identifying and solving technologically based problems. Five short courses and seminars were presented under a continuing education program to indoctrinate business and industrial managers, operating engineers and technicians in the technology of critical path methods, hydraulic power and control, dynamics of automotive suspensions, dynamics of lighting and vision, and advanced welding.

NEW HAMPSHIRE.—New Hampshire's initial State Technical Services program has sixteen project activities designed to aid the private economic sector achieve growth, diversification, and technical excellence. The core of the program is a combined technical field and information activity located at the University of New Hampshire. Technical education services (workshops, seminars, and short courses) are designed to direct the resources of the educational community to the solution of technological problems throughout the State. A wide range of program components have been developed to aid industry, including a computer technology workshop, a civil engineering computer project, PERT-CPM, zero defects, materials testing, and computer time-sharing workshops and demonstrations. A distinctive contribution is a project to infuse new technology in all facets of the ski industry.

NEW JERSEY.—New Jersey is nearing the completion of its five-year plan and first annual program under the leadership of the Division of Economic Development of the Department of Conservation and Economic Development. The State is participating with Pennsylvania and Delaware in radio programs on new developments in technology initiated by the Pennsylvania State Technical Services. A special grant to the Stevens Institute for a course on Advanced Spectroscopy and Nuclear Magnetic Resonance is transferring new technology to New Jersey industry, among others. Several communities of upper New Jersey also expect to benefit from a special program operating in the metropolitan New York area for dry cleaners in which the latest technologies in dry cleaning are being introduced throughout these individually owned and operated business establishments.

NEW MEXICO.—Through the State Technical Services program, New Mexico offers varied activities designed to promote the more effective use of science and technology by business, commerce and industry. The retrieval, processing, and selective dissemination of technical information to industry through the Technology Application Center provides access to literature, techniques, processes, and procedures which are applicable to technologically based problems. Educational services encompass a comprehensive program of seminars, conferences and short courses designed to encourage industry to make greater use of technical information. Field services assist industry in maintaining an awareness of developing technologies. A comprehensive directory for scientific, technical and managerial expertise in New Mexico was prepared to provide referral service to industrial users. Three educational institutions participated in the conduct of the technical services program in New Mexico.

NEW YORK.—More than 25,000 scientists, engineers, technicians, and managers from over 10,000 companies were assisted by the State Technical Services Program in New York State during fiscal year 1968. Excellent support from the State administration and legislature combined with Office of State Technical Services support has enabled 19 universities and other institutions to use their resources to help New York industry attain excellence and economic growth. Effective educational programs were conducted by 16 of the institutions in such subject areas as nuclear science, industrial pollution control, plastics, ceramics, metallurgy, machine technology, and food processing. Field work to ascertain and solve industrial problems were provided by 14 of the institutions and increased support for this activity will be emphasized in the future. Information and referral services combine to link industry with expertise and technical literature.

NORTH CAROLINA.—The State Technical Services program is making rapid progress in increasing the economic growth of the State. The technical information center distributed over 30,000 photocopies of technical advances to industry. The North Carolina Science and Research Center ran computer searches in such areas as furniture, packaging, pigments, alkali metal silicotes, and beneficiation of minerals. The field liaison program visited 1,005 firms to provide technical information. Directories of North Carolina Professional Engineers and North Carolina Research, Development and Testing Laboratories were requested by a multitude of firms. Four short courses and two education TV courses were presented in the areas of: protection of electric circuit and machines, engineering applications of electronic computers, statistical procedures of textile mill management, numerical control, and noise control technology.

NORTH DAKOTA.—Technical services were conducted by North Dakota through the Industrial Services Program of North Dakota State University, Fargo, North Dakota. This service is a comprehensive state-wide information dissemination/in-plant assistance program with three major objectives: (1) establishing a systematic means of identifying the industrial problems of specific sectors of industry in North Dakota, (2) assisting in the solution of these problems through the use of both formal and informal means of disseminating technical information, and (3) encouraging the institutions of higher learning within the state to participate in the dissemination and service efforts to "bridge the gap" between business and the institutions. The program includes a referral system, in-plant visitation services, technical counseling and assistance, evaluation of efforts and program follow-up activities.

OHIO.—Fiscal year 1968 was the first year in which each segment of the Ohio technical services program was fully operational in terms of providing direct and practical services to business and industry. The referral network system has become the principal focus of the Ohio State Technical Services program, and the eight university network offices assisted business and industry in 484 specific examples of referral activity. Field visits were the most important means of linkage between the network and industry, and nearly 1,000 such visits were made. A number of technical service programs were carried out in support of the major efforts of the network system. A number of separate educational programs were offered, providing the latest available knowledge on a wide variety of subjects to more than 500 representatives of business and industry.

OKLAHOMA.—The State Technical Services program in Oklahoma offered technical support to business, commerce and industry in three major categories: (1) information acquisition and dissemination; (2) field services; and (3) educational projects. Two field services projects, conducted by two educational institutions, are coordinated to provide personal contact with businessmen to isolate and identify key problems and to make referrals of information sources or expertise as required to effect solutions to technologically based problems. The field services activities are supplemented by information acquisition and library document and facilities services to business and industry. Six educational institutions participate in an educational program of courses, seminars and conferences covering a broad spectrum of technical subjects. The educational projects are coordinated and developed in response to needs determined through personal contact by field representatives of business and industrial personnel.

OREGON.—The program concentrated particularly on food processing, the fishing industry, rare metals and geology, in addition to general projects in the area of technical information dissemination and utilization. An all-day titanium symposium attracted more than 300 persons from four foreign countries and 12 states, representing over 100 business firms. It included the first U.S. report on a London conference on titanium. A field services project was implemented for the commercial fishing industry to keep the industry informed of technological advances in fishing vessel design, fishing gear and techniques, preserving, processing and marketing. Projects were also conducted to determine market potentials for recently developed food dehydration processes, to disseminate information on industrial uses of atomic energy, to compile and publish a directory of Oregon manufacturers and a register of technical expertise.

PENNSYLVANIA.—PENNTAP, the Pennsylvania Technical Assistance Program, offers three types of services: (1) information centers for answering technical questions, (2) reference services for identifying sources of technical expertise, and (3) workshops, seminars, short courses, and demonstrations. PENNTAP is aiding State industry to become outstanding in materials technologies, from the extraction or recovery of raw materials to refinement, utilization, and final consumption. Specialized technical information is now available at regional centers to any interested Pennsylvania enterprise. A mobile library program, through a "researchmobile," informs industry of what information is available and where to obtain it. A computer data file on carbon and graphite literature is being made available to industry as well as seminars on the application of engineering knowledge to textiles and seminars on technological advances in industrial color matching.

PUERTO RICO.—The State Technical Services program during fiscal year 1968 consisted of five main phases: seminars and extension courses, industrial advisors program, technical information center, demonstration projects, and special technical projects. Seminars and courses were attended by 369 industrialists, businessmen, and technicians. These educational projects were in such areas as linear programming, materials flow engineering, and petroleum processing. A conference on information technology aided the initiation of the Technical Information Center of Puerto Rico and the concept for the development of an Inter-American Technical Information Center. One hundred and ninety-two industrial firms were assisted by the Industrial Technical Advisory Program and this kind of service will soon be further aided by a Technical Directory of available consultants. Demonstration projects included the areas of new technology in the processing of meat, meat products and bakery products.

RHODE ISLAND.—Rhode Island launched its initial State Technical Services program in fiscal year 1968 and is already moving rapidly ahead to improve the industry and commerce of the State. The program is outstanding in its variety and innovative approaches to aid economic growth. Educational projects include the areas of: computer technology for medium and middle-sized firms, textile technology, food industry technology, advanced technology for pharmacists, industrial precious metals electroplating, antipollution and new technology for engineers. A field service is provided for the Rhode Island fishing industry to disseminate the latest scientific and technological knowledge to maintain and advance the industry's competitive position. Through the University of Rhode Island, a New England Marine Resources Information Center has been established to upgrade all marine industries so that they can develop better and new products and exploit new opportunities for growth.

SOUTH CAROLINA.—The State Technical Services program is aimed at assisting South Carolina industry as it moves from an agricultural and textile base to a more balanced, sophisticated complex of industries. Information services, referral assistance, technical consultation, and seminars and workshops have been patterned to fit the present and future opportunities of industry. Seminars were presented in subjects concerning computers, engineering materials, and color measurement. Contact was made with 2,300 companies to inform them of the technical information and custom searches provided by State Technical Services. Inquiries have been concerned with new processes, new equipment, and new products that can be developed from new technology. A catalog of South Carolina manpower, research and development and manufacturing facilities is nearing completion. Field services have been effective in ascertaining and solving a wide variety of industrial problems.

SOUTH DAKOTA.—South Dakota's technical services program consists of a series of interrelated activities, each of which provides a particular type of service to the State's business, industry and commerce. The services include reference services, educational services, and field services. The field services program is a comprehensive effort to encourage business and industry to use science and technology more effectively. It consists of an inventory of technical capabilities, field visits to acquaint firms with the services and to identify problems, a referral service for sources of expertise, and coordination of the other activities to meet the needs of business and industry. A program of technical information services disseminates and interprets technical information for business firms, and provides requested referral and problem-solving assistance. The South Dakota Inventor's Congress publication is also provided as part of the State Technical Services program.

TENNESSEE.—Technical services in Tennessee became fully operational with some 448 persons participating in the eleven educational service projects conducted at five participating institutions. In addition, field engineers made over 1200 industrially oriented visits: many of these were counseling visits in response to specific requests for assistance. In Tennessee, the field engineers have proven to be technology transfer agents in a very real sense. The referral service and educational service activities, while undoubtedly effecting technology transfer influences, serve a supporting role. Another major contribution of the State Technical Services program in Tennessee has been an improvement in the rapport between the institutions of higher education and the business and industrial communities. This has come about as the participating institutions become better informed about the intent of the program and gain additional insight into the technological needs of industry.

TEXAS.—One of the more successful projects in the Texas State Technical Services program is the Industrial Information Service (IIS) being operated by Southern Methodist University. The IIS conducted five public technical seminars on campus and five "in-house" seminars, loaned 1,982 documents, and made photo-copies of 2,053 documents totaling 15,473 pages. Five educational institutions conducted seminars, conferences and workshops on time-shared computers, high polymers, industrial techniques, chemical processing, and technology for application in the urban environment. A catalog of research facilities and personnel in Texas was compiled and technical information services were provided through two projects to manufacturing companies and the petroleum industry. Over $58,000 in user fees, collected by participating institutions during fiscal year 1968, is indicative of business confidence in the services provided through the Texas State Technical Services program.

UTAH.—The Industry Referral Service of the Utah Industrial Services Agency (UISA) made 183 referrals that resulted in significant benefits to individual firms in many diverse areas of business and industry. Approximately 500 competent consultants are registered participants in the USIA Industry Referral Service. This free service helps Utah business and industry to be continually aware of new technology in specific fields of technical interest. During fiscal year 1968, 5,500 subscribers received Technology Announcements in technical subject areas of indicated specific interest. By nearly every quantitative measurement, this service has approximately doubled in the past year. Three educational institutions participated in technical short courses, seminars and conferences for business and industry. The UISA field services representatives made 2,507 contacts with Utah business firms during fiscal year 1968, and also successfully handled 306 requests for technical assistance.

VERMONT.—Vermont has made substantial gains in economic growth through the State Technical Services program. The Space Research Institute, attracted to the State by State Technical Services, is continuing to develop as a multimillion dollar research center which provides a resource for the technical services program to rely upon. Waste materials that cause pollution in streams are being turned into marketable products. Seminars and workshops are offered in PERT/CPM, plastics design in steel, non-destructive testing, fluidics, and lasers. Vermont is a forerunner in the use of Federal Data Analysis Centers to aid Vermont industry with timely, up-to-date technical knowledge, from machinability data to plastics technology. A demonstration project on a computerized cost monitoring system for small and medium sized firms is having favorable results. Direct contact with industry is provided by a field counselling service backed by a technical information and referral center.

VIRGINIA.—Virginia State Technical Services completed its first year of operations during fiscal year 1968. Six institutions of higher education participated in the activities which included educational programs, information dissemination, and field services. Two information services projects are providing technical information in a useful form to marine-resource based industry and the preparation of a handbook on the industrial applications of neutron activation analysis. Through the field services personal contact has been made with over 250 firms, and numerous problems have been identified and solved. Field services have proven to be most productive in the transfer of technology and in providing a communication link between education and industry. An expansion of field services is planned for the future. Technical services are being provided the forest products and seafood processing industries.

VIRGIN ISLANDS.—The scope, direction, and goals of the Virgin Islands State Technical Services program is to accelerate the scientific and economic growth of industry and commercial establishments throughout the Islands. Projects that have been outstandingly effective include a presentation of advanced technology to the printing industry, a course on engineering aspects of landscape architecture, a human resources directory for the Islands, a conference on mechanization of resort hotel and restaurant operations, a course on systems for managerial decision-making, a lecture series designed to up-grade engineers, architects and builders on modern techniques and developments in building construction, a two-day conference on mechanics of ground handling of aircraft, and a service for the collection and dissemination of research and technical information. With these projects, the Virgin Islands State Technical Services program is making significant progress toward achieving the objectives of its five-year plan.

WASHINGTON.—Fifteen projects were completed in the Washington State Technical Services program in the principal areas of the state's economic activity, namely: forestry, wood products, marine sciences, fisheries, aerospace, nuclear science, and food processing. Four educational institutions participated in a series of short courses, seminars, and conferences to acquaint business and industrial managers, technicians, and engineers with the latest technology in selected subjects. Television was used to disseminate information on current oceanographic research to business and technical groups within oceanography-related businesses in a series of ten thirty-minute programs. A central reference center was maintained to provide technical information, assistance, and referral to sources of expertise for forest products and other industries. Two libraries participated in providing broad-based technical reference material to business and basic polymer material to the chemical industry.

WEST VIRGINIA.—West Virginia is realizing many positive results from the State Technical Services program. Field services are provided by the West Virginia Department of Commerce, West Virginia University, and Technical Consultants, Inc. These services have been backed by information service projects at the same institutions. Technical News Briefs were issued in many technical areas, including the welding of light gage aluminum, fly ash utilization, ultrasonics, metalworking, and new ways to reclaim copper from scrap. Educational projects include glass technology, and use of isotopes in industry. A technical reference service is leading to the publication of a directory on scientific and engineering expertise. The reference service also referred individuals and firms to sources of professional technical and engineering expertise for solving industrial problems and for introducing new products.

WISCONSIN.—Technical services in Wisconsin are provided through four major activities: information and referral, field services, new technology briefings, and instructional projects. The emphasis, however, is on the first three activities, since the traditional offerings of the Wisconsin Extension Service have been well established and have provided a strong base of self-supporting non-credit courses. In the information and referral service project, the principal effort is the development of a single access point to provide industry with both a source of information and a switching point to other sources of information. The field service program is limited initially to the Milwaukee area where about 50 percent of the states total industry is located. The new technology briefings are designed to acquaint the top management industrial manager with elements of new and changing technology, with an emphasis on applications in industrial operations.

WYOMING.—The Wyoming Technical Assistance Program (WYTAP) became fully operational during fiscal year 1968. A one-man field advisory and referral service was established on September 1, 1967. By the end of the fiscal year, WYTAP had handled 110 requests for information, assistance, and referral through this service. In addition, contacts were made with individuals, groups, and business firms to publicize the State Technical Services program and to gain information regarding technical interests and needs. Under a special program grant, WYTAP, in cooperation with the Rocky Mountain Technical Services Council and the Federation of Rocky Mountain States, Inc., conducted a "Rocky Mountain Regional Conference on Air Pollution" that attracted over 100 attendees from throughout the region and nation. Educational projects included seminars on concrete technology, both old and new, and on production and utilization of native Wyoming lumber.

TECHNOLOGY TRANSFER

> *"If we want to maintain the momentum built up over the past two years, I think we have to look specifically for examples of technology transfer that have taken place through your efforts, and that show results in terms of economic benefits. And we have to begin to investigate benefits in terms of improvement in cost control, profits, employment, products, processes, and plans for organizational and operational practices. And we need these solid kinds of results to have the kind of evaluation which we are not only bound by law to provide, but also to see where we have been and where we are going in this program."*
>
> *Alexander B. Trowbridge*
> *Former Secretary of Commerce*

The goal of the State Technical Services program is to make actual transfers of technology to business, commerce, and industry. The State Technical Services Act provides that transfers are to be made through such technical services as field counselling, information activities, reference and referral services, and educational programs.

The individual States have established technical services appropriate to local needs and local resources. Over the relatively short period that technical services programs have been underway in the States, many examples have been reported of tangible, practical gains in profits, efficiency, new jobs, reduced costs, and increased quality. These achievements are taking place in such industries as construction, electronics, ceramics, fishing, food-processing, forestry, metal-working, mining, petroleum, printing, stone quarrying, textiles, and wood-working.

This section of the annual report lists some examples of technology transfer from among many that have been recorded by the States. Examples are grouped here by the type of technical service: Field Services, Reference and Referral Services, Information Services, Educational Programs, Demonstrations, and Interstate and International Services. The last is a new activity that is growing in importance and effectivenesss. As States become mutually acquainted with their specialized resources and expertise, an exchange of assistance in solving technical problems develops. Occasionally, foreign resources are utilized.

(The examples have been listed by States within the technical services categories. No State is listed more than once within a category even though, in many instances, States have reported many other meritorious examples.)

I. FIELD SERVICES

Field services are increasingly becoming the key factor in most State systems for technical services to industry. As the programs become established, the States have felt the need to go out to firms and find out what the actual problems of industry are. With this acquired knowledge, the technical services of the States are being specifically tailored to respond to local needs and local economic opportunity.

As the list of examples indicates, many technical problems of industry are being solved by the ability of State Technical Services field representatives to ascertain the need for aid and then to call on State, regional, national, and international information services and expertise to solve problems or exploit opportunities for local economic growth.

ALABAMA.—A study of the operation of a sawmill resulted in data which provided management with costs and returns by diameter and grade of five species of logs so that expansion of the business could be undertaken on a profitable basis.

ALASKA.—A mineral resources specialist gave technical assistance leading to the establishment of a minerals concentration plant in the Fairbanks area and a fisheries specialist was instrumental in having scallop boats brought to the coast of Alaska to initiate a major fisheries industry.

ARKANSAS.—An Arkansas feed manufacturer increased production nearly 50 percent by adopting recommendations (for installation of a pellet mill, an auger conveyer, and increased storage capacity) made by State Technical Services personnel.

DELAWARE.—Several plastics manufacturers in Delaware have developed a random-cut process for making flock filler for panels from plastics waste. One Delaware firm will consolidate and reprocess the waste by the new method, instead of a considerably more expensive machining process which has been used.

GEORGIA.—A polyurethane material adopted as a liner for hydrocyclones (for separating sand and gravel) on the recommendation of a Georgia State Technical Services field engineer was so successful in extending the life of the machines that it was later applied to the mixing blades inside ready-mix concrete trucks with a marked reduction in frequency of expensive replacement efforts.

ILLINOIS.—The State Technical Services program in Illinois assisted a manufacturer of bleacher boards to convert to a new painting system known as "curtain coating" which reduced spray losses from more than 60 percent to less than 10 percent with improved uniformity of application. The company expects to save $25,000 in the first year—about four times the cost of conversion to the new equipment.

IOWA.—A State Technical Services field man from the Center for Industrial Research and Services assisted an Iowa metal-tube manufacturer in reducing a prohibitive rejection rate by detecting causes of discoloration and pinholes.

LOUISIANA.—A paddle and oar manufacturer that had been in business for 50 years depleted his local source of lumber and importing supplies had become too expensive. Assistance from the State Technical Services program enabled the firm to produce a competitive plastic paddle and to expand into other plastic products.

MICHIGAN.—A Michigan tool-and-die manufacturer asked the State Technical Services field engineer at Ferris State College for assistance in butt-welding stainless-steel sheets to permit him to produce an item at lower cost than outside purchase. Together with the NASA Technology Utilization Center at Wayne State University, the field engineer assembled applicable technical information and located a metallurgical consultant. The company not only learned to make the butt-welded product but is now planning to broaden its product line as a result.

MINNESOTA.—A company engaged in the manufacture of delicate electronic equipment was having trouble with corrosion failures to soldered joints six to eight months after delivery of the product to the customer. State Technical Services recommended a new system of quality control of purchases and a new method of cleaning solder flux from the joints. Correcting these two conditions solved the problem for the company.

MONTANA.—Montana, in its fiscal year 1968 program, assisted 85 firms through its field service to mines. The industry was also assisted in developing geochemical wall rock studies and the design of portable milling facilities.

NEVADA.—A Nevada Industrial Extension Service was requested to provide information on the feasibility of manufacturing skis out of synthetic material. State Technical Services obtained suppliers, materials properties, design procedures, and methods of production. The first pair of experimental skis performed so well that a corporation formed to produce them.

NEW YORK.—A New York roofing contractor, who had recently added urethane foam spraying to his operation, consulted a State Technical Services man on a problem of foam deterioration caused by ultraviolet rays of the sun. Several chemical coatings were suggested, together with a less costly pine-resin substitute for the urethane. The substitute was selected, and the company's president estimates savings of more than $80,000 per year.

NORTH CAROLINA.—A small North Carolina manufacturer of aluminum chairs had stopped production of his best seller because concern had been expressed over its strength and design. A State Technical Services field engineer calculated forces on all components and showed that the chair was thoroughly safe. The company resumed production at a rate of 30,000 chairs per year.

OREGON.—A field service for the fisheries industry brought about intra-industry cooperation and also effected a major advance in reducing bacterial contamination and upgrading product quality.

PUERTO RICO.—A leather belt factory was having problems with its production flow process. A technical adviser assisted the manufacturer in the latest methods of machinery and equipment layout. Production has since increased 75 percent, and the labor force increased 43 percent to keep up with demand.

SOUTH CAROLINA.—A small metal working firm was in a position to increase sales by $200,000 annually if they could process material fast enough. The State Technical Services field service made suggestions concerning inventory control, expediting, and paper-work flow, so that the firm was able to satisfy the requirements of a major new customer.

UTAH.—A Utah manufacturer of submersible pumps had, for years, tolerated as unavoidable some problems associated with porosity of purchased aluminum housings—water seepage, pump failures, expensive replacements, and customer-relations problems. A State Technical Services field engineer suggested several impregnants and sources of expert advice on their use. As a result, the company adopted such an impregnation step and totally eliminated the failures.

VERMONT.—Vermont was faced with the problem of stream pollution from a cheese-making waste product called whey. The Vermont State Technical Services program supplied information on how this waste could be turned into lactose sugar for a new industry in Vermont. It is planned to obtain the cooperation of the Economic Development Administration for supplying financial resources for getting the new industry into production.

VIRGIN ISLANDS.—During a field visit to one of the Islands' printing establishments, it was pointed out that a Heidelberg letter press in the shop could be utilized as a die-cutting press. State Technical Services undertook to supply this printer with information and instructions on die-cutting so that a new industry could be developed in the Islands.

VIRGINIA.—A State Technical Services field representative called on a NASA-developed technique to help a large Virginia electronics firm to solve a problem of formation of solder "icicles" on printed-circuit boards.

II. REFERENCE AND REFERRAL SERVICES

Reference and referral services are designed to identify sources of scientific and technical expertise in response to the needs of industrial and commercial firms for solving problems or opening the way to new products and new businesses.

Many of the States are issuing directories of engineering and scientific expertise for referral, where these were previously unavailable for locating local and national sources of professional assistance.

Many small firms have been found to have no knowledge of how to locate specialists and professional consultants to aid in the solution of pressing problems. Through State Technical Services efforts, more and more instances are being recorded in which referral of firms by State Technical Services to professional engineering consultants resulted in new products, new production methods, and new quality performance.

ARKANSAS.—A manufacturer requested State Technical Services assistance in solving a corrosion problem involving the manufacture, storage and shipment of small plated parts. A source of expertise was located and recommended to the firm. Suggested changes in the plating bath solutions and humidity of the storage area has materially reduced the corrosion previously encountered.

COLORADO.—A Colorado firm was having problems in drying plastics products after their ejection from a molding machine. A referral to a company which is involved in microwave drying techniques resulted in work toward a solution.

GEORGIA.—In Georgia, a new type of compressed brick composed of sand rather than clay was introduced through the State Technical Services program. This is a wholly new product with only one other plant in operation in North America. A faculty member of the School of Ceramic Engineering worked closely with this company. In a similar fashion, new developments in the use of plastics instead of clay for bricks have been furnished to the brick industry in Georgia.

MICHIGAN.—A foundry developed problems in casting brass so that 25 percent of production was assigned to scrap. A consultant recommended by State Technical Services examined the castings and made three corrective changes which reduced the scrap rate to one percent.

NORTH CAROLINA.—A large North Carolina manufacturer of synthetic fibers requested State Technical Services assistance in installation and certification of cobalt reactors; commercial firms which they had contacted were unfamiliar with their equipment. Referral was made to the Nuclear Engineering Department at North Carolina State University which supplied the needed assistance.

OHIO.—An Ohio company needed a short method of determining bacteria counts in a lubricating coolant—extensive efforts of their own had failed to shorten the analysis from 48 hours. The State Technical Services Referral Network Office at Cleveland State University recommended a consulting biochemist who provided a method which can be completed in 8 hours.

TENNESSEE.—A firm which specializes in applying a corrosion resistant coating to process piping encountered a porosity problem and requested the Tennessee State Technical Services for help in locating professional consultants. Two such consultants were referred to the company and they were successful in overcoming the technical process problem.

UTAH.—A small Utah concrete-aggregate firm has a line of marble-finished window sills, counter tops, etc., which were subject to bowing and warping in the longer items with no successful remedy. A civil-engineering professor/consultant—recommended by the State Technical Services program there—traced the problem to the actual aggregate used and suggested an effective solution.

WEST VIRGINIA.—The State Technical Services program in West Virginia assisted a manufacturer of stainless-steel industrial safety cans to overcome a problem of corrosion caused by microscopic cracks which developed during bending and welding. The company had been sending their products out for a costly acid treatment. On the advice of the Materials Science Engineering Department of West Virginia University, an in-house annealing process was substituted at reduced cost.

WYOMING.—WYTAP, the State Technical Services program in Wyoming, arranged for a professor at the University of Wyoming and one of his students to assist a firm in determining the electrical power required to keep sulfur molten and to operate pumps to transport the sulfur by pipeline.

III. INFORMATION SERVICES

Information services consist of technical information centers, including technical libraries, that make available information that is needed to solve problems of industry. Many varieties of these centers exist; in general, they are small and frequently call on established information resources of national or regional significance to assemble a complete response.

ARKANSAS.—Two young Arkansas engineers obtained information from State Technical Services on laser performance and availability on which they established a new business to manufacture an improved device for alignment of sewer pipe.

FLORIDA.—A Florida company interested in manufacturing light weight aggregate for construction blocks was provided technical assistance through the State Technical Services program at the University of Florida. The company is now planning the establishment of a pilot plant on the technical information provided to it.

KANSAS.—A manufacturer of tractor cabs requested information on improving the cab design from the standpoint of safety, comfort and production. Technical information on soundproofing, safety and durability was provided by State Technical Services, and a new line is now about to be announced.

MICHIGAN.—A medium-sized Michigan manufacturer of die-[illegible] auto parts was experiencing a high rate of [illegible] failure of his dies and was uncertain of the efficacy and economic return of a proposed hardening process. The State Technical Services director at Eastern Michigan University searched the file of a NASA Regional Dissemination Center and discovered proof that the process would be effective. With this reassurance, the company adopted the die-hardening process and achieved a substantial cost reduction.

NEW YORK.—In upstate New York, a ready-mix concrete firm which had always found it necessary to shut down during the winter months and idle its work force was helped toward year-round operation. The State Technical Services program at St. Lawrence University showed them how to quarry and cut a local architectural stone during the winter, thereby increasing sales and employment.

NORTH CAROLINA.—The Raleigh, N.C., works of a major chemical company consulted the State Technical Services program for advice on disposal of a waste liquor containing about one-fifth sulfuric acid and traces of nitric acid and other materials. Economy and pollution control were both achieved by the suggestion that the waste be neutralized with ammonia to produce an ammonium sulfate-nitrate fertilizer—the other materials were determined to be harmless to crops.

OREGON.—An Oregon State Technical Services Newsletter informed the commercial fishing industry of a new technique for stabilizing fishing vessels using fluid stabilization tanks. At least two vessels in the commercial fishing fleet are currently under construction employing this new technique.

PENNSYLVANIA.—In Pennsylvania, a manufacturer of textile machinery experienced serious trouble with the failure of a newly-designed key part. The State Technical Services program at Pennsylvania State University traced the problem to a hardening process and suggested changes. Reliability was restored and, since many of these machines are exported, overseas repair of the machines was eliminated.

TEXAS.—The engineering staff of a Texas company had been at work on structural problems causing warping, creeping, and distortion of a large alloy retort used for high-temperature soaking in their commercial process; new designs and new alloy materials had been explored. Contact with the State Technical Services program provided new information on high-temperature alloys—especially advanced stainless steels—which permitted redesign of the retort and fabrication from a new material with resultant improvement in product quality, durability, and temperature control at sharply reduced costs.

UTAH.—A new foundry business was established in Utah after the State Technical Services program furnished a prospective entrepreneur with information and advice on investment molding materials, aluminum castings, mold-release compound, zinc-aluminum die casting, and induction furnaces for melting steel.

WEST VIRGINIA.—A West Virginia manufacturer of battery-operated mine equipment sought State Technical Services assistance in developing solid-state controls to reduce loads on the batteries. Applicable information was obtained for the firm from the Bureau of Standards and several industrial sources.

IV. EDUCATIONAL PROGRAMS

Educational programs include workshops, seminars, short courses, and conferences to convey useful scientific and technical knowledge to groups of technical and management personnel in business, industry, and commerce.

Regular university courses of semester length often do not have an appeal to industrial personnel because of the time required to obtain the essentials of a subject. State Technical Services short courses and seminars are filling a need for intensive transfer of knowledge in a short time. In addition, taped television presentations are being used at many locations to provide low-cost transfer of technology.

Educational programs are designed to meet local needs and conditions and, therefore, vary widely among the States.

CALIFORNIA.—With State Technical Services assistance, Community Television of Southern California, KCET, Channel 28, Los Angeles, produced and presented a series of one-hour programs under the title R&D REVIEW. In addition to being shown on educational television stations in California, these programs are being shown on stations in 20 other States and the District of Columbia through the "BONUS circulation" of National Educational Television Network. Although only 22 percent of the R&D REVIEW telecasts and 15 percent of the INNOVATIONS telecasts had been aired, a total of 221 mail and telephone referrals have been serviced.

CONNECTICUT.—The Connecticut Research Commission sponsored a conference on "The Influence of Technological Innovation on the Future of Connecticut." A distinguished group of national and Connecticut leaders attended the conference. The result has been the Connecticut State Technical Services program will be re-oriented to enable Connecticut industry to "leapfrog" obsolescent products and methods and maintain excellence as a leading industrial State.

DISTRICT OF COLUMBIA.—Using techniques learned in a critical paths methods seminar sponsored by State Technical Services, builders are able to obtain financing more easily by providing more pertinent information to bankers. This method is being recommended by one bank to builders as an ideal method for financial proposal submissions.

HAWAII.—A series of seminars on computer technology was presented to Hawaii executives by the State Technical Services program there. Attendance was over 500 and follow-up is being maintained to introduce computer advances in the travel and other industries.

MAINE.—Maine State Technical Services program has sponsored highly successful seminars and workshops on new technological innovations for over 600 engineers and now communicates the latest technological advances to over 4,000 businesses and individuals. The Maine short courses, provided by the University of Maine, revived continuing education for engineers for Maine.

MASSACHUSETTS.—A State Technical Services educational program was initiated at Northwestern University to bridge the gap in new knowledge of professional engineers who have been out of the university only a relatively short time. The courses are problem-oriented and tailored to the industrial areas important to Massachusetts and neighboring States.

MISSOURI.—A design engineer for a St. Louis manufacturer of valves for aerospace systems attended a State Technical Services short course in "Modern Valve Technology" at Washington University. As a result of new knowledge gained, he improved the design of a specific valve by improving the pressure-port, increasing the flow, and reducing the valve coefficient and the weight. His company has requested repetition of the course for the benefit of other members of its technical staff.

NEW YORK.—Under the New York State Technical Services program, Renesselaer Polytechnic Institute conducted a workshop on computer methods for engineering analysis and design which was planned to meet the needs of small organizations and practicing engineers without access to powerful computers or prior experience in computer work. One engineer returned to his company and wrote a computer program for conducting in four seconds a common computation which had routinely taken four to six hours in the past.

UTAH.—A Utah printing firm used the State Technical Services information system to get technical information on printing on metals. On the basis of the information received, the company entered a new business and is already selling signs, markers, and nameplates produced by the new process.

V. DEMONSTRATIONS

Demonstrations of new technology are used to bring new techniques and knowledge directly to the attention of those in industry that can use and apply it. Often the demonstrations are given at the very work area of the potential user, including the use of special vans to demonstrate machining techniques or information resources. At other times, individuals from industry are brought to the site of the equipment, as in the case of computers or nuclear facilities.

Demonstrations are especially valuable for permitting the uninitiated to operate complex pieces of equipment in an educational atmosphere where mistakes can be made in the normal learning process without embarassment.

ILLINOIS.—Three Illinois construction companies participated jointly in a State Technical Services project using a time-shared computer. One of the companies estimated savings up to $60,000 in direct labor costs alone during the first year. Starting in January 1968, the project was expanded to serve 16 companies from a single direct-access computer with potential annual savings approaching $5 million.

WASHINGTON.—In Washington, a State Technical Services demonstration—conducted jointly with the College of Fisheries at the University of Washington and the State Department of Agriculture—of the use of irradiation in processing of fish and agricultural products caused one of the largest wheat ranchers in the State to experiment with irradiated seeds. Early results were so effective that he is now planning an experiment involving 900 acres.

WEST VIRGINIA.—West Virginia has a large number of small manufacturers who spray paint their products. Spray painting has been an inefficient operation as up to 50 percent of the paint is wasted and rejects often occur. The Applied Technology Center of West Virginia University, with State Technical Services support, is encouraging the use of an electrostatic paint process based on unlike charges of electricity causing the paint to adhere quickly and evenly. This process has great advantages as the front and back of the workpiece can be painted at the same time and with practically no paint loss. With paint equipment contributed by a manufacturer, West Virginia University is demonstrating this up-to-date method to manufacturers. Savings in paint, labor, equipment, rejects, floor space, and maintenance are being realized.

WISCONSIN.—With State Technical Services assistance, Wisconsin has developed a mobile unit to teach modern manufacturing technology to industry in Wisconsin and surrounding States. The potential use of this mobile unit to States in other parts of the country that have similar problems is being investigated.

VI. INTERSTATE AND INTERNATIONAL SERVICES

A new kind of technical service is developing in the coordinated employment of nationwide technical resources to solve local problems and exploit opportunities for growth of local industry.

Earlier examples indicate how national information services (such as those provided by the National Aeronautics and Space Administration, the Department of Defense, and the Atomic Energy Commission) are being called on for special items of technology which are useful in industry. This section shows how the information resources of more than 200 educational and other institutions in the State Technical Services program are being called upon to provide needed information to solve problems across the nation, whether or not the information resource is located in the State where the problem arises. This kind of technical service will grow in importance as coordination and communication among State programs increase.

MARYLAND-VIRGINIA-NORTH CAROLINA.—Virginia has a number of small seafood processing firms with a variety of problems. The Virginia State Technical Services organized a committee of processors, public health officials, and research personnel from the States of Maryland, North Carolina, and Virginia to aid the industry. The first result has been the development of a tri-State standardized procedure for the pasteurization of crab meat.

NEW HAMPSHIRE-New YORK.—A New Hampshire company needed new outlets for its supply of wood flour. The State Technical Services field man in New Hampshire contacted the Office of State Technical Services which arranged for the information to be obtained from the Syracuse University, School of Forestry where the New York State Technical Services program supports an excellent information service in forest products.

NEW JERSEY-PENNSYLVANIA.—A New Jersey company needed information on how it could expand and improve its graphite manufacturing business. The Pennsylvania State Technical Services Program supports a Carbon and Graphite Information Center at Pennsylvania State University directed by an outstanding scientist in this area. The Pennsylvania State Technical Services expedited use of the information center for the benefit of the New Jersey firm.

OKLAHOMA-NEW YORK-DELAWARE.—An Oklahoma State Technical Services field man needed information for a firm which wished to manufacture cellulose from waste material. Arrangements were made with the Syracuse University School of Forestry and the du Pont Information Center to provide necessary information to undertake this new industry.

UTAH-PENNSYLVANIA-MASSACHUSETTS-COLORADO.—A manufacturer in Utah needed a source of steel edges for skis. The Utah State Technical Services communicated with all State Technical Services designated agencies. The Pennsylvania program recommended a Massachusetts company which in turn recommended a Colorado source which was the nearest to Utah.

UTAH-SOUTH AFRICA.—A Utah aerial survey organization needed information concerning the methods necessary to transfer azimuth down a 3,200 foot shaft. Complete data including equipment specifications and drawings were obtained through State Technical Services from a source in South Africa.

VERMONT-CANADA.—The Vermont State Technical Services attracted the Space Research Institute which was leaving Canada. The center has developed into a multimillion dollar operation which is providing a nucleus of scientists and engineers to aid all Vermont industry with expertise.

VIRGINIA-PENNSYLVANIA.—The State Technical Services program in Virginia obtained information on plating equipment and procedures from their sister organization in Pennsylvania to assist a metal-stamping plant in expanding into electroplating.

SPECIAL MERIT PROGRAMS DIVISION

> *Section 10(c). The Secretary may reserve an amount equal to not more than 20 per centum of the total amount appropriated for each year under this section and is authorized to make payments from such amount to any designated agency or participating institution for technical services programs which he determines have special merit or to any qualified institution for additional programs which he determines have special merit or to any qualified institution for additional programs which he determines are necessary to accomplish the purposes of this Act, under criteria and regulations that he shall promulgate and publish in the Federal Register.*

The Special Merit Programs Division supports technical services programs that have broad regional or national significance or employ new techniques or methods not included in State programs. Emphasis continues to be placed on projects which support and complement State programs.

Fiscal Year 1968 Activity. A total of 45 proposals were reviewed during fiscal year 1968 for funding by the Special Merit Programs Division. Requests amounted to $1,748,510 in Federal funds, for a total program effort in excess of $3.6 million. Of these, twenty programs were funded with Federal funds for $595,000, and 25 requests were turned down or withdrawn. The distribution of special merit grant funds by type of institution and type of service is shown in Table III.

Table III.—Special Programs Grant Funds—Fiscal Year 1968

	Information and referral services		Educational services		Demonstrations		Field services		Total	
	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent
Colleges and universities..	$119,830	20.0	$226,029	37.9	$52,283	8.8	$30,857	5.2	$428,999	72.1
Industry associations	55,350	9.3	78,850	13.5	14,392	2.4	17,408	2.9	166,000	27.9
Total..........	175,180	29.3	304,879	51.4	66,675	11.2	48,265	8.1	594,999	100.0

Types of Special Program Grants. Special Merit grants are being used to aid the States in developing regional programs of common interest. In these programs, the best technological resources of the region are brought to bear on problems common to the region, without regard to State boundaries. For example, a grant has been made to the University of Rhode Island to develop a New England Marine Resources Information Program. The program, which is designed to establish communication links between sources of technical information and users in the fishing industry, the waterfront recreational industry, and other kinds of marine-based industry, aims to serve the entire New England region.

National programs which serve an industry throughout the country and also serve State designated agencies have a high priority in the granting of special program funds. An example of this type is a program undertaken by the Graphic Arts Technical Foundation for a national technical information service for the graphic arts industry, a technical advisory service, a technical seminar service, and a technical education service to provide technological and systems information in textbook and audio-visual form. In addition to serving the graphic arts industry directly, this program provides materials and services to State designated agencies to aid them in serving local graphic arts establishments.

Experimental programs, which include well-designed evaluation techniques, have also received a large share of special merit funds. A grant has been made to the University of Vermont for an experimental program to determine the usefulness of a selected group of Federally-supported information analysis centers in answering questions posed by Vermont industry. The results will be of interest to other States and regions and to information analysis centers seeking a wider audience in the private sector. Plans are being made for a careful evaluation of the results of this program.

In fiscal year 1968, eight regional programs totaling $140,476, three national programs totaling $195,770, and nine experimental programs totaling $258,753 were funded.

Review and Evaluation Criteria. Criteria used to evaluate special merit proposals are essentially the same as those used in previous years. However, in the third year of the program, in evaluating programs of equal merit, some consideration has been given to bringing in geographical areas not yet participating in the special merit program. The criteria used are listed below.

1. Technological and economic need for the program.
2. Potential technological and economic impact of the program.
3. Probability of achieving program objectives.
4. Suitability and effectiveness of program methods.
5. Competence of staff.
6. Total program cost.
7. Program cost as related to need, impact, and methods.
8. Sources and amounts of matching funds.
9. Probability of program becoming self-sustaining.
10. Uniqueness of program.
11. If a regional program, degree of cooperation among States in the region.
12. If a national program, amount of support that will be provided to State programs.
13. Proposed evaluation techniques.
14. Geographical considerations to bring in areas not participating in special merit programs.

Table IV.—Classification of Special Program Division Grants in Fiscal Year 1968

A. SPECIAL PROGRAMS—Regional

Grantee	Region	Type of program	Industry served
1. Neighborhood Cleaners Association	New York, New Jersey, Connecticut	Information Services	Drycleaning
2. University of Arizona	Arizona, New Mexico, Nevada	Educational Services	General
3. Cornell University	Northeast	Educational Services	Construction
4. Rice University	Gulf Coast	Information Services	General
5. University of Rhode Island	New England	Information Services Field Services Educational Services	Marine Resources
6. University of Washington	Pacific Northwest	Educational Services	Wood Technology
7. University of Wyoming	Rocky Mountain	Educational Services	Air Pollution Control

B. SPECIAL PROGRAMS—National

Grantee	Region	Type of program	Industry served
8. Graphic Arts Technical Foundation, Inc.		Information Services Educational Services Field Services Demonstrations	Graphic Arts
9. Newark College of Engineering		Educational Services	General
10. University of Redlands		Educational Services	International Trade

Table IV.—Classification of Special Program Division Grants in Fiscal Year 1968—Con.

C. SPECIAL PROGRAMS—Experimental

Grantee	Type of program
11. Georgia Institute of Technology	Field Service Information Service Demonstrations Educational Services
12. Stevens Institute of Technology	Educational Services
13. University of Alabama	Educational Services
14. University of Alabama	Educational Services
15. State University of New York Binghamton	Educational Services
16. North Carolina State	Field Services Information Services Demonstrations Educational Services
17. Northeastern University	Educational Services
18. University of Vermont	Informational Services
19. University of Wisconsin	Educational Services
20. University of Wisconsin	Demonstrations

The following are brief descriptions of the 20 special merit grants which were made in fiscal year 1968.

A Demonstration of the Application of Technology Transfer Techniques to Two Contrasting Regional Industries (Mobile Homes Industry): This program is a joint effort between the Industrial Development Division of Georgia Institute of Technology and the Industrial Extension Service of North Carolina State University. In Georgia, one of the newer industries, the mobile homes industry, generally considered to be technically advanced and receptive to innovation, has been selected as the industry through which to demonstrate technology transfer techniques. A similar experiment is underway at North Carolina State with a traditional industry, the upholstered furniture industry. Georgia Institute of Technology, Atlanta, Georgia.

New and Expanded Graphic Arts Technical Information Dissemination Service: This program supports a Technical Information Service to acquire, retrieve, and disseminate science and engineering information to the entire industry, a Technical Advisory Service to provide a source of technical guidance by mail and personal contact, a Technical Education Service to provide new educational materials and a Special Programs Service to continue a program of seminars, workshops, conferences and forums. Graphic Arts Technical Foundation, Inc., 4615 Forbes Avenue, Pittsburgh, Pennsylvania.

Dissemination of New Technological Information to the Dry Cleaning Industry: This program aims to reach the small drycleaning plant owner with information about new fabrics and new dyes and how they should be treated through decentralized seminars and demonstrations before small local groups. Neighborhood Cleaners Association, 116 East 27th Street, New York, New York.

Conference on Management of New Developments: The purpose of the conference, which was held in Newark, September 7, 1967, was to bring scientists and engineers together with research administrators to discuss specific examples of methods of organizing and directing research and development that have led to successful utilization of scientific discoveries in producing new products. Newark College of Engineering, Newark, New Jersey.

Two Summer Institutes in Advanced Nuclear Magnetic Resonance (NMR) and Advanced Spectroscopy: The objective of these summer institutes is to bring information about recent advances in computer methods for the analysis of NMRand Mass spectral data to the attention of industry. Stevens Institute of Technology, Hoboken, New Jersey.

Flat Cable Technology: A seminar on Flat Cable Technology was held in the Graduate Studies Building, University of Alabama in Huntsville, January 22-26, 1968. This new technology, which had broad utility in industry, was presented to engineers and others concerned with the design and construction of systems involving extensive electrical cabling. Guest lecturers discussed the various aspects of flat conductor cables and their application. The sessions included a demonstration of the Marshall Space Flight Center flat conductor cable facility University of Alabama, Huntsville, Alabama.

Flat Cable Technology II: Because the response to the Seminar on Flat Cable Technology, held in January (see above) was larger than could be accommodated and many requests to rerun the Seminar were received, the program was repeated on April 1-5, 1968. University of Alabama, Huntsville, Alabama.

Regional Conference on Problems of Technological Transfer and Economic Growth in the Southwestern U.S.: The purpose of the conference, which included a thorough discussion of the problems peculiar to the Southwestern region, is to generate interest in technological growth in that area. The Conference was held on March 14 and 15 at Tucson, Arizona. University of Arizona, Tucson, Arizona.

Special Continuing Education Program for the Construction Industry, Phase III: This grant will continue the program funded in 1966 and 1967 to improve management methods in the construction industry by introducing modern technical knowledge and management techniques and to provide engineers in the construction industry with a means for combating technical obsolescence. Cornell University, College of Engineering, Ithaca, New York.

Use of Video Tapes for Continuing Education at Remote Industrial Centers: This program aims to demonstrate the effectiveness of using video tape recordings of graduate level engineering courses in new technologies on a non-credit basis for continuing education use at industrial centers remote from engineering schools. This techniques could have considerable significance for application on a national scale for industries remote from educational centers which have a pressing need to update their technical personnel. School of Advanced Technology, State University of New York, Binghamton, New York.

A Demonstration of The Application of Technology Transfer Techniques to Two Contrasting Regional Industries (Furniture Industry): This program is a joint effort between the Industrial Extension Service of North Carolina State University and the Industrial Development Division of Georgia Institute of Technology. In North Carolina, the upholstered furniture industry, one of the traditional industries, generally thought to be relatively slow to take advantage of technological innovations has been selected as a demonstration industry. The methods of technology transfer found most effective will be compared to those used in an emerging industry (mobile homes industry) demonstrated in Georgia at Georgia Institute of Technology. North Carolina State University, Raleigh, North Carolina.

Project Gap—For Disseminating Scientific Knowledge Through Continuing Education Programs and Starting Recent Graduates on a Lifetime Regimen of Continuing Engineering Studies: This program aims to bridge the gap between engineering education and seasoned professional practice at the forefront of technology with problem-oriented courses tailored to the industrial areas important to the Northeastern Region. Northeastern University, Boston, Massachusetts.

Applications of New Technology to Key Operations in International Trade: Under this project, five films will be prepared and made available for showing on a national basis. The first of the five films is Technology and Trade—The Interface of Change, an overview of the relation of technology and trade. The next three films will be focused on specific areas where breakthroughs have been made, and on the availability of these techniques for other areas of application. These three films will deal with 1) Communication and Information Systems, 2) Terminals, Transportation, and the Ports—Where New Techniques Apply, and 3) Break-through in the Technology of Freight Forwarding. The fifth film, The Promise of Technology and the Requirements of Trade—A Projection, will explore the requirements of the greatly burgeoning trade of the next 20 years, the solutions called for, with an examination of the capacity of still developing technology to provide these solutions. International Trade Communications and Research Institute, University of Redlands, Hollywood, California.

Regional Information and Communication Exchange: This provides for the continuation for another year of the Regional Information and Communication Exchange serving the Gulf Coast area. The Exchange utilizes teletype facilities linking 13 colleges and university libraries for the purpose of disseminating technical and scientific information to business, commerce and industry. Rice University, Houston, Texas.

New England Marine Resources Information Program: This program is designed to establish effective communication links between sources of technical information and users in the fishing industry, the waterfront recreational industry, and other kinds of marine-based industry. University of Rhode Island, Kingston, Rhode Island.

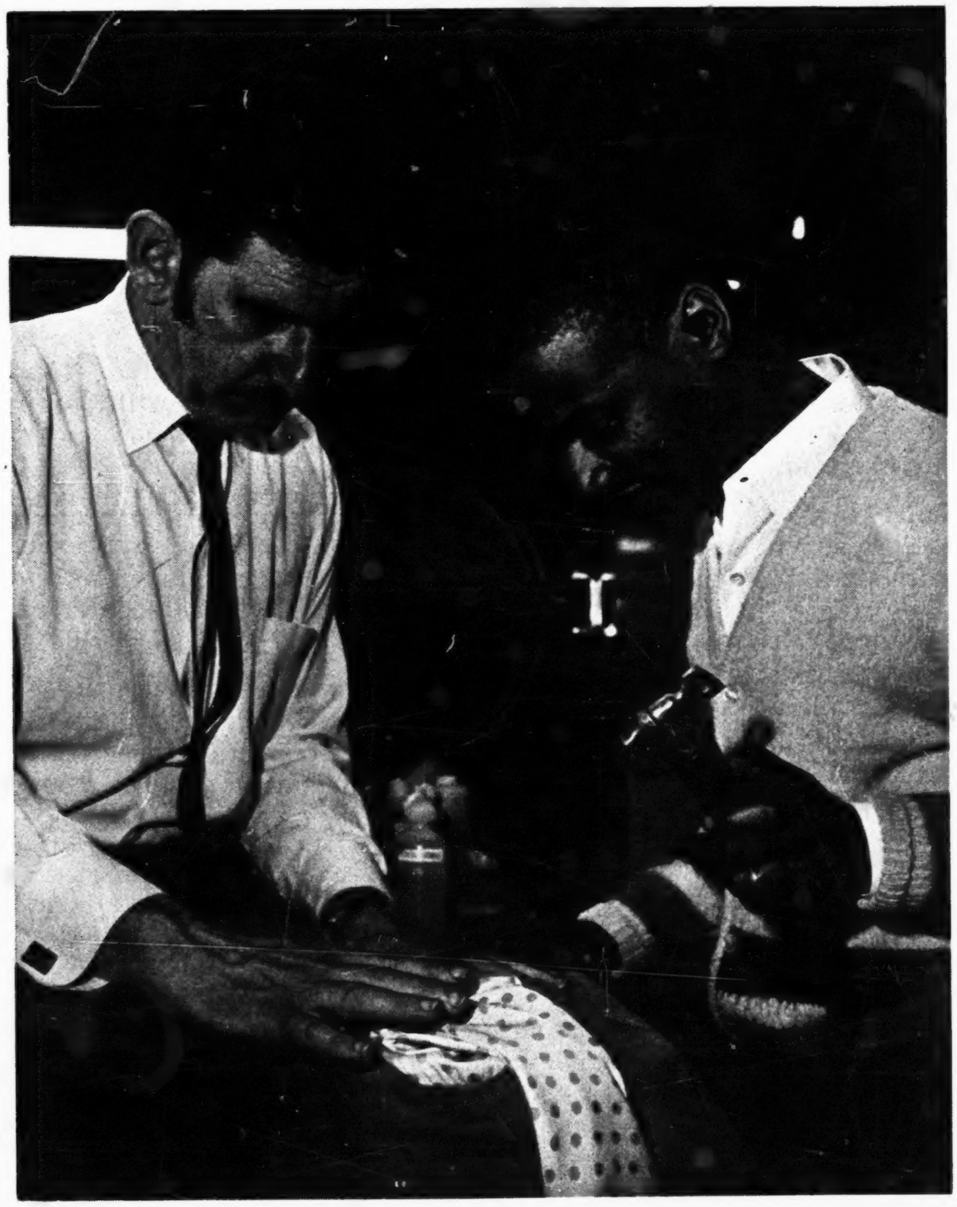
Utilization of Selected Federal Information Analysis Centers: The aim of this program is to evaluate the usefulness of a selected group of Federally supported information analysis centers in answering technical questions posed by Vermont industry. The results will be of interest to other States and regions and to information analysis centers seeking a wide audience. University of Vermont, Burlington, Vermont.

Wood Technology Information Transfer in Washington and the Pacific Northwest: The objective of this program is to update the wood-processing industry in Washington and the Pacific Northwest through the use of innovative new methods such as audio-visual devices and video taping. University of Washington, Seattle, Washington.

Film on the Teaching of Modern Manufacturing Technology to Industry With a Mobile Unit: A mobile laboratory unit has been developed and demonstrated successfully in Wisconsin to teach modern manufacturing technology by bringing demonstrations directly to the plant. This film will promote the development of this type of unique program not only in the State of Wisconsin, but also throughout the country. University of Wisconsin, Madison, Wisconsin.

The Teaching of Modern Manufacturing Technology to Industry With a Mobile Unit: Through this program, industry is provided with fundamental, noncredit, on-site instruction in basic production technology. Additional technical demonstrations, e.g., numerical control and automatic or adaptive control will be developed. University of Wisconsin, College of Engineering, Madison, Wisconsin.

Rocky Mountain Regional Conference on Air Pollution: This conference provided information to firms and consultants in the Rocky Mountain Region regarding causes, effects, and control of air pollution and encouraged the early establishment of air pollution control measures. The conference, held at the University of Wyoming, Laramie, November 16-18, 1967, included discussions on 1) Air Pollution as a Community Problem, 2) Causes and Types of Air Pollution, 3) Effects of Air Pollution, and 4) Economics of Air Pollution. University of Wyoming, Laramie, Wyoming.



REFERENCE SERVICES DIVISION

Section 11: The Secretary is authorized and directed to aid designated agencies in carrying out their technical services programs by providing reference services which a designated agency may use to obtain scientific, technical, and engineering information from sources outside the State or States which it serves, for the purposes of this Act.

The Reference Services Division assists State and interstate technical services programs in obtaining technical information.

Assistance is provided by:

1. Arranging and conducting Technology Transfer Seminars for State program personnel engaged in field counselling, technical information services, and administration.
2. Developing techniques by which State programs can make the most effective use of Federal, private, national, regional, and State information resources.
3. Planning regional technical information programs for the most effective use of shared resources.
4. Observing and reporting significant new developments in the field of information technology for the benefit of State programs.
5. Maintaining technical liaison with national and regional information services to match State program needs with available resources.

The Reference Services Division has concentrated its efforts on providing answers to technical problems rather than literature citations, which are not generally useful to smaller industrial organizations. Advantage is taken of the output of the extensive information analysis and technology utilization programs of the National Bureau of Standards, the Department of Defense, the National Aeronautics and Space Administration, and the Atomic Energy Commission.

This use of information analysis centers is one part of the concept of repackaging through which State Technical Services programs can utilize advanced technology more effectively. Repackaging involves a series of individual steps—identification, collection, synthesis, and interpretation—designed to compress a large mass of information from many sources into its most useful form.

Funds were obligated by the Reference Services Division in fiscal year 1968 as follows:

Contract Services	
1. Establishment of the Learning Resources Information Analysis Center, in conjunction with the Engineers Joint Council.	$40,000
2. Technology Transfer Training Program—Phase I—with the Aerospace Research Applications Center of Indiana University.	$6,600
3. Technology Transfer Training Program—Phase II—with the Battelle Memorial Institute.	$25,000
Services With Other Agencies	
4. Inter-State Referral Services Pilot Program, in conjunction with the National Referral Center of the Library of Congress.	$75,000
5. Technology Transfer Research. Joint support, with the National Science Foundation, of publication of the findings of important research in technology transfer.	$15,000

Items of information acquired, evaluated, and provided to State programs in fiscal year 1968 are listed in Appendix E. These items consisted of policy planning documents, sources of information and expertise in technology transfer, and other material thought to be of value in the administration and conduct of the State Technical Services program.

RELATIONSHIPS WITH OTHER GOVERNMENT AGENCIES

> *Section 10(e)(2): No funds appropriated pursuant to the provisions of this section shall be paid to any designated agency, participating institution, or person on account of any such agency or institution, to carry out any technical services activity or program in any State if such activity or program duplicates any activity or program readily available in such State from Federal or State agencies, including publicly supported institutions of higher learning in such State.*

Effective working relationships with other Government agencies concerned with technology transfer have been continued and enlarged. There has been frequent, sometimes continuous, cooperation between State Technical Services projects and the Clearinghouse for Federal Scientific and Technical Information and the National Referral Center for Science and Technology.

Some Federal agencies which conduct extensive research and development—particularly the National Aeronautics and Space Administration, the Department of Defense, and the Atomic Energy Commission—have formal programs for disseminating the information they produce. Other Federal agencies which serve clearly-designated segments of the American economy—such as the Economic Development Administration and the Small Business Administration—have obligations to assist business in acquiring technical information. The Office of State Technical Services works very closely with these agencies, and the nationwide State Technical Services network is frequently used as the means by which this technology is disseminated.

Under a special merit program of particular interest, the University of Vermont has been granted direct access to selected information analysis centers sponsored by the Department of Defense, the Atomic Energy Commission, and other Federal agencies. The centers were previously employed exclusively in the service of these agencies. Now, the resources of these information centers are being opened to the use of Vermont industry in a systematic and controlled new experiment.

The Office of State Technical Services has an active role in the work of the Committee on Scientific and Technical Information (COSATI) of the Federal Council on Science and Technology, which guides a Government-wide effort to coordinate scientific and technical information. The Director of the Office of State Technical Services represents the Department of Commerce at COSATI meetings, and other staff members serve on COSATI Panels on Operational Techniques and Systems and on Education and Training.

A cooperative project with the Library of Congress' National Referral Center for Science and Technology was conducted to expand the Center's information on technical expertise in the South and to promote use of its services by southern State Technical Services programs. In cooperation with the National Science Foundation, the Office of State Technical Services assisted in publishing the findings of some significant research on technology transfer.

APPENDIX A: FINANCIAL SUMMARY

TOTAL PROGRAM COMMITMENT BY STATE

State	Fiscal year			Three-year total
	1966	1967	1968	
Alabama:				
Planning grant	$25,000	$15,000	$15,000	$55,000
State grant	------	86,000	92,250	178,250
Special grant	------	------	4,812	4,812
Total Federal	25,000	101,000	112,062	238,062
State matching	------	86,000	92,250	178,250
Special matching	------	------	6,305	6,305
Total program	25,000	187,000	210,617	422,617
Alaska:				
Planning grant	25,000	15,000	15,000	55,000
State grant	------	------	38,100	38,100
Total Federal	25,000	15,000	53,100	93,100
State matching	------	------	39,760	39,760
Total program	25,000	15,000	92,860	132,860
Arizona:				
Planning grant	25,000	15,000	20,000	60,000
State grant	------	66,350	57,200	123,550
Special grant	------	------	6,444	6,444
Total Federal	25,000	81,350	83,644	189,994
State matching	------	83,740	81,886	165,626
Special matching	------	------	6,499	6,499
Total program	25,000	165,090	172,029	362,119
Arkansas:				
Planning grant	25,000	15,774	------	40,774
State grant	32,108	64,000	65,400	161,508
Total Federal	57,108	79,774	65,400	202,282
State matching	54,946	64,000	65,688	184,634
Total program	112,054	143,774	131,088	386,916
California:				
Planning grant	23,385	15,000	13,746	52,131
State grant	66,141	260,843	300,773	627,757
Special grant	------	------	72,000	72,000
Total Federal	89,526	275,843	386,519	751,888
State matching	66,141	260,843	305,638	632,622
Special matching	------	------	72,000	72,000
Total program	155,667	536,686	764,157	1,456,510

APPENDIX A—Continued

State	Fiscal year			Three-year total
	1966	1967	1968	
Colorado:				
Planning grant.	$25,000	$15,000	$20,000	$60,000
State grant	------	69,029	68,464	137,493
Total Federal	25,000	84,029	88,464	197,493
State matching.	------	80,389	106,777	187,166
Total program.	25,000	164,418	195,241	384,659
Connecticut:				
Planning grant.	25,000	13,050	20,000	58,050
State grant	------	73,629	103,583	177,212
Total Federal	25,000	86,679	123,583	235,262
State matching.	------	74,000	103,583	177,583
Total program.	25,000	160,679	227,166	412,845
Delaware:				
Planning grant.	25,000	14,000	20,000	59,000
State grant	------	36,850	43,392	80,242
Total Federal	25,000	50,850	63,392	139,242
State matching	------	36,850	43,392	80,242
Total program.	25,000	87,700	106,784	219,484
District of Columbia:				
Planning grant.	25,000	14,000	15,000	54,000
State Grant	------	47,414	50,890	98,304
Special grant	------	24,580	------	24,580
Total Federal	25,000	85,994	65,890	176,884
State matching	------	47,414	50,890	98,304
Special matching	------	24,581	------	24,581
Total program.	25,000	157,989	116,780	299,769
Florida:				
Planning grant.	25,000	15,000	20,000	60,000
State grant	67,396	113,500	------	180,896
Total Federal	92,396	128,500	20,000	240,896
State matching.	67,397	113,502	------	180,899
Total program.	159,793	242,002	20,000	421,795
Georgia:				
Planning grant.	25,000	15,000	20,000	60,000
State grant	77,010	97,500	97,500	272,010
Special grant.	------	58,300	62,567	120,867
Total Federal	102,010	170,800	180,067	452,877
State matching.	77,010	97,500	97,500	272,010
Special matching	------	68,300	62,567	130,867
Total program.	179,020	336,600	340,134	855,754
Guam:				
Planning grant.	------	25,000	25,000	50,000

APPENDIX A—Continued

State	Fiscal year 1966	1967	1968	Three-year total
Hawaii:				
Planning grant	$25,000	$15,000	$8,900	$48,900
State grant	------	41,480	46,645	88,125
Total Federal	25,000	56,480	55,545	137,025
State matching	------	41,480	46,669	88,149
Total program	25,000	97,960	102,214	225,174
Idaho:				
Planning grant	25,000	19,930	8,625	53,555
Illinois:				
Planning grant	25,000	13,320	15,000	53,320
State grant	166,406	191,043	200,000	557,449
Total Federal	191,406	204,363	215,000	610,769
State matching	171,363	192,098	454,282	817,743
Total program	362,769	396,461	669,282	1,428,512
Indiana:				
Planning grant	25,000	------	------	25,000
Special grant	------	5,000	------	5,000
Total Federal	25,000	5,000	------	30,000
Special matching	------	25,000	------	25,000
Total program	25,000	30,000	------	55,000
Iowa:				
Planning grant	25,000	15,000	19,560	59,560
State grant	71,269	83,000	85,000	239,269
Total Federal	96,269	98,000	104,560	298,829
State matching	71,269	83,000	85,000	239,269
Total program	167,538	181,000	189,560	538,098
Kansas:				
Planning grant	25,000	15,924	14,938	55,862
State grant	31,260	69,130	85,000	185,390
Total Federal	56,260	85,054	99,938	241,252
State matching	31,260	75,140	94,335	200,735
Total program	87,520	160,194	194,273	441,987
Kentucky:				
Planning grant	25,000	------	25,000	50,000
State grant	------	------	95,050	95,050
Total Federal	25,000	------	120,050	145,050
State matching	------	------	95,051	95,051
Total program	25,000	------	215,101	240,101

APPENDIX A—Continued

State	Fiscal year			Three-year total
	1966	1967	1968	
Louisiana:				
Planning grant	$25,000	$15,000	$15,000	$55,000
State grant	65,000	87,456	88,834	241,290
Special grant	------	13,059	------	13,059
Total Federal	90,000	115,515	103,834	309,349
State matching	65,000	88,599	95,498	249,097
Special matching	------	13,059	------	13,059
Total program	155,000	217,173	199,332	571,505
Maine:				
Planning grant	25,000	15,000	20,000	60,000
State grant	------	50,567	53,370	103,937
Total Federal	25,000	65,567	73,370	163,937
State matching	------	50,567	53,370	103,937
Total program	25,000	116,134	126,740	267,874
Maryland:				
Planning grant	25,000	------	------	25,000
Massachusetts:				
Planning grant	25,000	15,000	20,000	60,000
State grant	------	------	62,351	62,351
Special grant	------	50,600	35,295	85,895
Total Federal	25,000	65,600	117,646	208,246
State matching	------	------	62,351	62,351
Special matching	------	50,600	35,295	85,895
Total program	25,000	116,200	215,292	356,492
Michigan:				
Planning grant	25,000	15,000	15,000	55,000
State grant	174,670	176,000	160,800	511,470
Total Federal	199,670	191,000	175,800	566,470
State matching	174,670	231,386	160,884	566,940
Total program	374,340	422,386	336,684	1,133,410
Minnesota:				
Planning grant	25,000	15,000	19,500	59,500
State grant	31,491	102,744	131,891	266,126
Total Federal	56,491	117,744	151,391	325,626
State matching	31,491	102,744	131,892	266,127
Total program	87,982	220,488	283,283	591,753
Mississippi:				
Planning grant	25,000	------	------	25,000

APPENDIX A—Continued

State	Fiscal year			Three-year total
	1966	1967	1968	
Missouri:				
Planning grant	$25,000	$15,000	$15,000	$55,000
State grant.	44,330	105,251	131,900	281,481
Special grant	------	21,550	------	21,550
Total Federal	69,330	141,801	146,900	358,031
State matching	44,330	110,719	182,260	337,309
Special matching	------	21,617	------	21,617
Total program	113,660	274,137	329,160	716,957
Montana:				
Planning grant	$25,000	$15,000	$20,000	$60,000
State grant	9,702	51,000	50,947	111,649
Total Federal	34,702	66,000	70,947	171,649
State matching	9,702	67,290	70,617	147,609
Total program	44,404	133,290	141,564	319,258
Nebraska:				
Planning grant	25,000	14,014	15,000	54,014
State grant	------	57,356	80,000	137,356
Total Federal	25,000	71,370	95,000	191,370
State matching	------	57,356	99,999	157,355
Total program	25,000	128,726	194,999	348,725
Nevada:				
Planning grant	24,230	14,795	20,000	59,025
State grant	------	40,783	39,400	80,183
Total Federal	24,230	55,578	59,400	139,208
State matching	------	69,024	164,314	233,338
Total program	24,230	124,602	223,714	372,546
New Hampshire:				
Planning grant	25,000	16,000	20,000	61,000
State grant	------	------	45,455	45,455
Total Federal	25,000	16,000	65,455	106,455
State matching	------	------	45,455	45,455
Total program	25,000	16,000	110,910	151,910
New Jersey:				
Planning grant	25,000	------	5,000	30,000
Special grant	11,470	------	8,470	19,940
Total Federal	36,470	------	13,470	49,940
Special matching	11,470	------	16,500	27,970
Total program	47,940	------	29,970	77,910
New Mexico:				
Planning grant	25,000	15,416	20,000	60,416
State grant	------	46,310	50,670	96,980
Total Federal	25,000	61,726	70,670	157,396
State matching	------	46,315	64,391	110,706
Total program	25,000	108,041	135,061	268,102

APPENDIX A—Continued

State	Fiscal year			Three-year total
	1966	1967	1968	
New York:				
Planning grant	$23,500	$15,000	$15,000	$53,500
State grant	199,275	300,000	355,000	854,275
Special grant	23,070	117,320	118,150	258,540
Total Federal	245,845	432,320	488,150	1,166,315
State matching	199,275	300,000	602,359	1,101,634
Special matching	23,070	132,672	147,190	302,932
Total program	468,190	864,992	1,237,699	2,570,881
North Carolina:				
Planning grant	25,000	6,000	24,780	55,780
State grant	85,545	131,546	129,771	346,862
Special grant	------	8,814	60,864	69,678
Total Federal	110,545	146,360	215,415	472,320
State matching	85,545	133,573	139,885	359,003
Special matching	------	15,266	60,864	76,130
Total program	196,090	295,199	416,164	907,453
North Dakota:				
Planning grant	25,000	------	------	25,000
State grant	20,440	------	------	20,440
Total Federal	45,440	------	------	45,440
State matching	20,440	------	------	20,440
Total program	65,880	------	------	65,880
Ohio:				
Planning grant	25,000	15,000	15,000	55,000
State grant	------	151,698	213,783	365,481
Total Federal	25,000	166,698	228,783	420,481
State matching	------	151,698	230,145	381,843
Total program	25,000	318,396	458.928	802,324
Oklahoma:				
Planning grant	25,000	13,020	15,120	53,140
State grant	50,000	70,129	75,000	195,129
Total Federal	75,000	83,149	90,120	248,269
State matching	50,000	70,129	75,000	195,129
Total program	125,000	153,278	165,120	443,398
Oregon:				
Planning grant	11,220	15,000	14,623	40,843
State grant	------	67,000	68,200	135,200
Total Federal	11,220	82,000	82,823	176,043
State matching	------	69,340	68,200	137,540
Total program	11,220	151,340	151,023	313,583

APPENDIX A—Continued

State	Fiscal year			Three-year total
	1966	1967	1968	
Pennsylvania:				
Planning grant	$25,000	------	$25,000	$50,000
State grant	100,000	$192,399	206,375	498,774
Special grant	75,089	125,055	116,000	316,144
Total Federal	200,089	317,454	347,375	864,918
State matching	100,000	192,399	206,375	498,774
Special matching	75,090	201,500	206,435	483,025
Total program	375,179	711,353	760,185	1,846,717
Puerto Rico:				
Planning grant	25,000	15,000	15,000	55,000
State grant	39,580	72,800	85,000	197,380
Total Federal	64,580	87,800	100,000	252,380
State matching	43,135	81,325	105,331	229,791
Total program	107,715	169,125	205,331	482,171
Rhode Island:				
Planning grant	25,000	------	25,000	50,000
State grant	------	------	54,060	54,060
Special grant	------	705	36,969	37,674
Total Federal	25,000	705	116,029	141,734
State matching	------	------	54,060	54,060
Special matching	------	705	36,969	37,674
Total program	25,000	1,410	207,058	233,468
South Carolina:				
Planning grant	25,000	15,000	15,000	55,000
State grant	------	72,500	72,309	144,809
Total Federal	25,000	87,500	87,309	199,809
State matching	------	72,500	72,309	144,809
Total program	25,000	160,000	159,618	344,618
South Dakota:				
Planning grant	25,000	------	------	25,000
State grant	------	29,578	36,701	66,279
Total Federal	25,000	29,578	36,701	91,279
State matching	------	29,578	36,988	66,566
Total program	25,000	59,156	73,689	157,845
Tennessee:				
Planning grant	25,000	15,000	-----	40,000
State grant	45,499	91,500	96,336	233,335
Total Federal	70,499	106,500	96,336	273,335
State matching	45,499	91,534	96,336	233,369
Total program	115,998	198,034	192,672	506,704

APPENDIX A—Continued

State	Fiscal year			Three-year total
	1966	1967	1968	
Texas:				
Planning grant	$24,766	$15,000	$15,000	$54,766
State grant	90,796	167,804	191,327	449,927
Special grant	------	53,600	13,725	67,325
Total Federal	115,562	236,404	220,052	572,018
State matching	90,796	167,963	204,511	463,270
Special matching	------	71,610	38,643	110,253
Total program	206,358	475,977	463,206	1,145,541
Utah:				
Planning grant	25,000	15,000	20,000	60,000
State grant	27,427	54,000	57,300	138,727
Total Federal	52,427	69,000	77,300	198,727
State matching	27,427	54,000	115,022	196,449
Total program	79,854	123,000	192,322	395,176
Vermont:				
Planning grant	25,000	15,000	20,000	60,000
State grant	------	36,033	62,873	98,906
Special grant	------	------	15,640	15,640
Total Federal	25,000	51,033	98,513	174,546
State matching	------	36,033	62,873	98,906
Special matching	------	------	15,640	15,640
Total program	25,000	87,066	177,026	289,092
Virgin Islands:				
Planning grant	25,000	13,680	7,200	45,880
State grant	2,970	15,065	22,860	40,895
Total Federal	27,970	28,745	30,060	86,775
State matching	2,970	15,065	22,860	40,895
Total program	30,940	43,810	52,920	127,670
Virginia:				
Planning grant	25,000	------	------	25,000
State grant	------	97,999	100,000	197,999
Total Federal	25,000	97,999	100,000	222,999
State matching	------	98,000	100,000	198,000
Total program	25,000	195,999	200,000	420,999
Washington:				
Planning grant	25,000	18,120	20,000	63,120
State grant	60,000	93,000	88,548	241,548
Special grant	------	------	20,592	20,592
Total Federal	85,000	111,120	129,140	325,260
State matching	60,000	93,000	163,841	316,841
Special matching	------	------	20,592	20,592
Total program	145,000	204,120	313,573	662,693

APPENDIX A—Continued

State	Fiscal year			Three-year total
	1966	1967	1968	
West Virginia:				
Planning grant	$25,000	------	------	$25,000
State grant	------	$64,690	$59,925	124,615
Total Federal	25,000	64,690	59,925	149,615
State matching	------	64,695	59,944	124,639
Total program	25,000	129,385	119,869	274,254
Wisconsin:				
Planning grant	25,000	15,000	15,000	55,000
State grant	49,954	102,980	117,565	270,499
Special grant	------	26,760	21,425	48,185
Total Federal	74,954	144,740	153,990	373,684
State matching	49,954	103,100	134,153	287,207
Special matching	------	26,760	21,425	48,185
Total program	124,908	274,600	309,568	709,076
Wyoming:				
Planning grant:	25,000	15,000	20,000	60,000
State grant	------	------	35,210	35,210
Special grant	------	1,597	2,046	3,643
Total Federal	25,000	16,597	57,256	98,853
State matching	------	------	35,211	35,211
Special matching	------	1,597	5,500	7,097
Total program	25,000	18,194	97,967	141,161
GRAND TOTALS:				
Planning grants	1,307,101	647,043	781,992	2,736,136
State grants	1,608,269	3,827,956	4,453,008	9,889,233
Special grants	109,629	506,940	594,999	1,211,568
Total Federal	3,024,999	4,981,939	5,829,999	13,836,937
State matching	1,639,620	3,983,888	5,479,135	11,102,643
Special matching	109,630	653,267	752,424	1,515,321
Total program	$4,774,249	$9,619,094	$12,061,558	$26,454,901

APPENDIX B: CURRENT TECHNICAL SERVICES BULLETINS, MEMORANDA, AND ANNOUNCEMENTS

Number	Title	Date Issued
	Bulletins	
1	Principles for Determining Direct and Indirect Costs Applicable to State Technical Services Program Grants	April 1966 (Amended March 1967)
3	Content Requirements for State Program Submissions Under the STSA of 1965	June 1966
5	Recommendation for Increased Cooperation Between the Several Experimental Regional Dissemination Centers	August 1966
6	Clarification of STS Bulletin No. 1 Concerning Additional Compensation to Faculty Members for Personal Services	September 1966
7	Guidelines for Preparing Special Merit Program Proposals	September 1966
8	Procedure for Submitting STS Proposals Related to Wood Products, Forest Products, Forest Technology and Related Wood-Forest Products	March 1967
9	Guidelines for the Description of Projects in the Submission of Annual Technical Services Programs	March 1967
10	Cooperation Between the Atomic Energy Commission Programs for Dissemination of Technical and Scientific Information and State Technical Services Program Activities	June 1967
14	Procedure for Submitting STS Proposals Related to the Processing and Marketing of Agricultural Products and to Other Business and Services Oriented to Agriculture	August 1967
15	Guidelines and Formats for Standard OSTS Reimbursement Vouchers and Summary of Quarterly Reimbursement Request Forms	May 1968
17	Guidelines and Formats for Standard OSTS Category Reimbursement Vouchers and Summary of Quarterly Reimbursement Request Forms	December 1968
	Memoranda	
5	OSTS Policy Regarding Allowable Expenses for Participants in Special Merit or State Technical Services Programs	August 1966
9	Equal Opportunity and Civil Rights Compliance Review	May 1967
11	Recognition of Federal Support of STS Projects	October 1967

Number	Title	Date Issued
	Memoranda	
14	OSTS Policy Concerning Indirect Costs of Technical Projects	April 1968
15	Bureau of the Budget Circular A-87 — Principles for Determining Costs Applicable to Grants and Contracts with State and Local Governments	June 1968
16	OSTS Policy Concerning Indirect Cost Rate Computations of Participating Not-for-Profit Institutions	June 1968
17	The State Technical Services Program Must Become Better Known	July 1968
18	Recognition of Volunteered Uncompensated Services as Non-Federal Matching Contributions Under the STS Act	July 1968
20	Optional Granting Procedures for Fiscal Year 1969	September 1968
21	Forms and Instructions for Final Reports of Planning Grant Expenditures	
22	Allowability of Conference Fees or User Fees Paid by the Federal Government for Employees Participating in State Technical Services Activities	November 1968
23	Information Required for the Consideration of Time Extensions by the Office of State Technical Services	December 1968
	Announcements	
1	Fiscal Year 1969 State Program Grant Requests	November 1968
2	Proceeding of the Annual National Conference on State Technical Services	December 1968
3	Reports of the Public Evaluation Committee for the State Technical Services Act of 1965	January 1969

APPENDIX C: OSTS PUBLICATIONS ISSUED DURING FISCAL YEAR 1968

STS NEWSLETTER VOL. III, No. 1	July-August 1967
No. 2	September-October 1967
No. 3	January-February 1968
No. 4	March-April 1968
No. 5	May-June 1968
OSTS SECOND ANNUAL REPORT, Fiscal Year 1967	January 1968
REPORT OF NATIONAL CONFERENCE ON STATE TECHNICAL SERVICES, October 10 and 11, 1967, Washington, D. C.	April 1968

APPENDIX D: PARTICIPATION BY QUALIFIED INSTITUTIONS

Section 2(c) "Qualified institution," means (1) an institution of higher learning with a program leading to a degree in science, engineering, or business administration which is accredited by a nationally recognized accrediting agency or association to be listed by the United States Commissioner of Education, or such an institution which is listed separately after evaluation by the United States Commissioner of Education pursuant to this subsection; or (2) a State agency or a private nonprofit institution which meets criteria of competence established by the Secretary of Commerce and published in the Federal Register.

Section 2(d) "Participating institution" means each qualified institution in a State, which participates in the administration or execution of the State Technical Services Program as provided by this Act.

Table V presents a summary of participating institutions, State designated agencies, other State agencies, and qualified nonprofit organizations taking part in the total fiscal year 1968 program, whether through planning, State programs, or special merit program grants.

Table V—Institutional Participation, Total State Technical Services Program in Fiscal Year 1968

Type of participating institution	Number
Public Institution of Higher Education	127
Private Institution of Higher Education	61
State Government Agency	49
Private Non-profit Institution	18
Total	255

The listing that follows identifies the institutions, agencies, and organizations by States participating in one aspect or another of the State Technical Services program whether it be administration, planning, State program, or special merit program.

ALABAMA
- Alabama Community and Technical Services Agency
- Auburn University
- University of Alabama
- Southern Research Institute

ALASKA
- Department of Economic Development and Planning

ARIZONA
- University of Arizona
- Arizona State University
- Northern Arizona University

ARKANSAS
- University of Arkansas

CALIFORNIA
- California Business and Transportation Agency.
- University of California
- California Health and Welfare Agency
- California State Library
- KCET-Community TV of Southern California
- University of Redlands

COLORADO
- Division of Commerce and Development
- Colorado School of Mines
- Colorado State University
- University of Colorado
- University of Denver

CONNECTICUT
- Connecticut Research Commission
- Connecticut State Library
- University Research Institute of Connecticut
- Rensselaer P. I. of Connecticut
- Fairfield University
- New England Research Application Center
- University of Connecticut
- University of Hartford
- University of Bridgeport

CONNECTICUT—Con.

Connecticut Development Commission
CETV Corporation

DELAWARE
University of Delaware

DISTRICT OF COLUMBIA
Consortium of Universities
Metropolitan D.C. Board of Trade
Catholic University
American University
Apparel Research Foundation
Howard University
George Washington University
Southeastern University

FLORIDA
Florida Development Commission

GEORGIA
University System of Georgia
University of Georgia
Georgia Institute of Technology
West Georgia College
Georgia State College
Albany State College

GUAM
University of Guam

HAWAII
Department of Planning and Economic Development
University of Hawaii
Chaminade College of Honolulu

IDAHO
Department of Continuing Education

ILLINOIS
Department of Business and Economic Development
University of Illinois
Southern Illinois University
Northern Illinois University

INDIANA
Indiana Educational Services Foundation

IOWA
State Board of Regents
Iowa State University
State University of Iowa
Iowa Wesleyan College
Drake University
University of Northern Iowa
Clark College
Morningside College
Buena Vista College

KANSAS
Research Foundation of Kansas
University of Kansas
Kansas State University
Wichita State University
Kansas State College of Pittsburg

KENTUCKY
Kentucky Department of Commerce
University of Louisville
University of Kentucky

LOUISIANA
Department of Commerce and Industry
Tulane University
University of Southwestern Louisiana
Louisiana Polytechnic Institute
Gulf South Research Institute
Louisiana State University
McNeese State College

MAINE
University of Maine
Bowdoin College
Department of Sea and Shore Fisheries

MARYLAND
University of Maryland

MASSACHUSETTS
University of Massachusetts
Northeastern University
Worcester Polytechnic Institute
Boston University
Babson Institute of Business Administration

MICHIGAN
Michigan Department of Commerce
Central Michigan University
Wayne State College
Ferris State College
Western Michigan University
Grand Valley State College
Northern Michigan University
Michigan Technological University
Eastern Michigan University
Michigan State University
University of Michigan

MINNESOTA
State Planning Agency
Department of Business Development
University of Minnesota
Bemidji State College
Mankato State College

MISSISSIPPI
Mississippi Research and Development Center

MISSOURI
- Department of Commerce and Industrial Development
- Drury College
- St. Louis University
- Washington University
- University of Missouri

MONTANA
- University of Montana
- Montana State University
- Montana College of Mineral Science Technology
- Eastern Montana College

NEBRASKA
- Department of Economic Development
- University of Nebraska
- University of Omaha
- Kearney State College

NEVADA
- University of Nevada

NEW HAMPSHIRE
- Office of the Governor
- New England Center for Continuing Education
- University of New Hampshire
- Dartmouth College

NEW JERSEY
- Department of Conservation and Economic Development
- Newark College of Engineering
- Stevens Institute of Technology

NEW MEXICO
- University of New Mexico
- New Mexico Institute of Mining and Technology
- New Mexico State University

NEW YORK
- New York Department of Commerce
- State University of New York at Buffalo
- State University of New York at Alfred
- Western New York Nuclear Research Center, Inc.
- University of Rochester
- Rochester Institute of Technology
- Syracuse University
- State University at Syracuse
- Rensselaer Polytechnic Institute
- Polytechnic Institute of Brooklyn
- New York University
- State University at Stony Brook
- Clarkson College
- St. Lawrence University
- Pratt Institute
- Cooper Union School of Engineering and Science
- State University at Binghamton
- City College of New York
- Cornell University
- Packaging Institute Foundation
- Neighborhood Cleaners Association
- Syracuse Reserve Corporation
- Manhattan College

NORTH CAROLINA
- North Carolina Department of Administration
- North Carolina State University at Raleigh
- University of North Carolina at Chapel Hill
- Research Triangle Institute
- North Carolina Board of Science and Technology
- North Carolina Science and Technical Research Center
- East Carolina University

NORTH DAKOTA
- State Planning Agency

OHIO
- Ohio Board of Regents
- Department of Development
- University of Akron
- University of Cincinnati
- Cleveland State University
- Kent State University
- Ohio State University
- Ohio University
- Miami University
- Wittenberg University
- Wright State University
- University of Dayton
- University of Toledo

OKLAHOMA
- Oklahoma State University
- Oklahoma City University
- Southeastern State College
- Southwestern State College
- University of Oklahoma
- Langston University

OREGON
- Oregon Department of Commerce
- Oregon State University
- University of Oregon
- Oregon Department of Geology and Mineral Industries
- Reed College Oregon Museum of Science and Industry

PENNSYLVANIA
- Pennsylvania State University
- Franklin Institute
- University of Pittsburgh
- Bucknell University
- Carnegie Library of Pittsburgh
- Graphic Arts Technical Foundation
- Philadelphia College of Textiles
- Duquesne University

PUERTO RICO
- Commonwealth Economic Development Administration
- University of Puerto Rico

PUERTO RICO—Con.

- Inter-American University
- Commonwealth Department of Commerce

RHODE ISLAND

- Office of the Governor
- University of Rhode Island
- Providence Engineering Society

SOUTH CAROLINA

- State Development Board
- The Citadel
- Clemson University
- University of South Carolina

SOUTH DAKOTA

- State Planning Agency
- South Dakota State University
- South Dakota School of Mines and Technology
- University of South Dakota

TENNESSEE

- University of Tennessee
- Vanderbilt University
- East Tennessee State University
- Tennessee Technological University
- Middle Tennessee State University
- Memphis State University
- Jackson State Community College

TEXAS

- Texas College and University System
- Texas A&M University
- North Texas State University
- Texas Women's University
- University of Texas
- Southern Methodist University
- Prairie View A&M College
- University of Houston
- Rice University
- Texas Christian University

UTAH

- University of Utah
- Utah State University
- Weber State College

VERMONT

- Vermont Development Department
- Norwich University
- University of Vermont

VIRGIN ISLANDS

- College of the Virgin Islands

VIRGINIA

- Virginia Polytechnic Institute
- University of Virginia
- University of Richmond
- Old Dominion College
- College of William and Mary
- Lynchburg College
- Virginia Military Institute

WASHINGTON

- Department of Commerce and Economic Development
- Gonzaga University
- University of Washington
- Washington State University
- Eastern Washington State College
- Pacific Lutheran University

WEST VIRGINIA

- West Virginia Department of Commerce
- West Virginia University
- Technical Consultants, Inc.
- Concord College
- Bethany College
- Shepherd College
- Wheeling College

WISCONSIN

- University of Wisconsin
- Marquette University

WYOMING

- University of Wyoming

APPENDIX E: OSTS REFERENCE ITEMS FURNISHED TO THE STATES, FISCAL YEAR 1968

Title	Date issued
ABSTRACTS OF OSTS BULLETINS	September 1, 1967
ABSTRACTS OF OSTS MEMORANDA	September 1, 1967
STATE UNIVERSITIES AND PUBLIC AFFAIRS, Major Papers Delivered at 1966 Meeting of the National Association of State Universities and Land-Grant Colleges	September 1, 1967
PROCEEDINGS OF THE CONFERENCE ON TECHNOLOGY TRANSFER AND INNOVATION	October 27, 1967
POCKET DATA BOOK — USA 1967, Bureau of the Census, U. S. Department of Commerce	October 27, 1967
UTILIZING R&D BY-PRODUCTS, Edited by Jerome W. Blood, Published by the American Management Association, New York, New York	November 7, 1967
REPORT ON THE STATE OF ILLINOIS COMMISSION ON AUTOMATION AND TECHNOLOGICAL PROGRESS	November 7, 1967
INFORMATION CAN BE MANAGED by Dr. Herbert A. Simon, THINK, May-June 1967, Vol. 33, No. 3, pp. 8-12	November 17, 1967
THE CHALLENGE OF TECHNOLOGY, Annual Conference on Science and the Humanities. A Conference Report from the National Industrial Conference Board	November 24, 1967
THE CHALLENGE OF INNOVATION, Seminar on Science and the Humanities, A Seminar Report from the National Industrial Conference Board (NICB)	December 1, 1967
THE REPORT OF THE PRESIDENT'S COMMISSION ON AUTOMATION — A CRITIQUE, National Industrial Conference Board, Public Affairs Conference Report, No. 4	December 8, 1967
APPLIED SCIENCE AND TECHNOLOGICAL PROGRESS — A Report to the Committee on Science and Astronautics, U. S. House of Representatives, by the National Academy of Sciences, June 1967	December 29, 1967
AN INTRODUCTION TO THE STUDY OF TECHNOLOGICAL CHANGE AND ITS CONSEQUENCES FOR REGIONAL DEVELOPMENT, Department of Business and Economic Development, State of Illinois, March 1967	March 22, 1968
U. S. INDUSTRIAL OUTLOOK, U. S. Department of Commerce, Business and Defense Services Administration, December 1967	March 22, 1968
INDUSTRIAL PROCESSES — Selected Citations on Industrial Processes appearing in U. S. Government Research and Development Reports	May 2, 1968
INFORMATION TECHNOLOGY, Selected citations on Information Technology appearing in U. S. Government Research and Development Reports	May 17, 1968
1968-69 DIRECTORY OF ENGINEERS IN PRIVATE PRACTICE, National Society of Professional Engineers	June 28, 1968

APPENDIX F: STATE CHIEF EXECUTIVES, DESIGNATED AGENCIES AND OFFICIALS, STATE TECHNICAL SERVICES WORKING CONTACTS AND ADVISORY COUNCIL MEMBERS

Designated Agencies for State Technical Services

Section 3. The Governor of any State which wishes to receive Federal payments under this Act in support of its existing or planned technical services program shall designate, under appropriate State laws and regulations, an institution or agency to administer and coordinate that program and to prepare and submit a plan and programs to the Secretary of Commerce for approval under this Act.

An analysis has been made of the placement of the designated agency responsibility and the principal State Technical Services working contact in State government, educational institutions and private non-profit institutions. Table VI, below, indicates the distribution of these responsibilities.

Table VI.— Placement of State Designated Agencies During Fiscal Year 1968

Designated agency organization	Principal official	Working contact
Office of the Governor	2	0
Other State Agency	25	23
State University Regents or System	5	4
University or College	18	24
Private Nonprofit Institution	4	3
Total	54	54

Advisory Councils for State Technical Services

Section 9. Each designated agency shall appoint an advisory council for technical services, the members of which shall represent broad community interests and shall be qualified to evaluate programs submitted under section 4. The advisory council shall review each annual program, evaluate its relation to the purposes of this Act, and report its findings to the designated agency and the Governor or his designee. Each report of each advisory council shall be available to the Secretary on request. Members of any such advisory council shall not be compensated for serving as such, but may be reimbursed for necessary expenses incurred by them in connection with attending meetings of any advisory council of which they are members.

APPENDIX F:—Con.

ALABAMA

Albert Brewer, Governor

Designated Agency

Dr. Fred R. Robertson, Chairman
Alabama Community and Technical Services Agency
Auburn University
Auburn, Alabama 36830

STS Working Contact

Mr. Kenneth O. Dessert, Director
State Technical Services
2827 E. South Blvd.
Governor's Square Shopping Center
Montgomery, Alabama 36111

Chairman, Advisory Council

Mr. Robert C. Willis, President
Alabama Society for Professional Engineers
Florence, Alabama 35630

Members, Advisory Council

Cole, Jack, President
Jack Cole Company
1900 Vanderbilt Road
Birmingham, Alabama 35234

Eugene R. Enslen, Past President
Alabama Society of Professional Engineers
1927 Norman Bridge Court
Montgomery, Alabama 36104

Grant, James W., Jr.
The James Grant Company
1710 Montgomery Highway
Dothan, Alabama 36301

Guffin, J. W., Regional Manager
The Arrow Company
Jasper, Alabama 35501

Happer, Carl
General Personnel Manager
Southern Bell Telephone Company
Birmingham, Alabama 35202

Harris, R. L., Vice President
Electric Operations
Alabama Power Company
P. O. Box 2641
Birmingham, Alabama 35202

Hayter, Gerald H.
Chief of Research
State Planning and Industrial Development Board
State of Alabama
Montgomery, Alabama 36104

Jackson, Emory O., Managing Editor
Birmingham World
213 North 17th Street
Birmingham, Alabama 35203

Mobley, Gilbert
Executive Vice President
Associated Industries of Alabama
Birmingham, Alabama 35222

Moquin, J. C., President
Brown Engineering Company, Inc.
300 Sparkman Drive
Huntsville, Alabama 35805

Peacock, W. Maxwell
Executive Secretary
Alabama Council of Retail Merchants
238 Adams Avenue
Montgomery, Alabama 36104

Puryear, Richard A., Jr., President
Alabama Gas Corporation
1918-20 North First Avenue
Birmingham, Alabama 35203

Schuler, John H., President
Anderson Electric Corporation
Leeds, Alabama 35094

Taylor, Glenn E., Vice President
Southern Railway System
2201 First Avenue, North
Birmingham, Alabama 35203

Turner, W. A.
Vice President for Research
Avondale Mills,
Sylacauga, Alabama 35150

Weeks, Barney, President
Alabama Labor Council, AFL-CIO
Birmingham, Alabama 35202

ALASKA

Walter J. Hickel, Governor

Designated Agency

Mr. Frank H. Murkowski
Commissioner
Department of Economic Development and Planning
Pouch EE
Juneau, Alaska 99801

STS Working Contact

Mr. Theron F. Borden
Deputy Director
Industrial Development Division
Pouch EE
Juneau, Alaska 99801

Chairman, Advisory Council

Mr. John Reekie, Jr.
Vice President
National Bank of Alaska
Box 1538
Ketchikan, Alaska 99901

ALASKA—Con.

Members, Advisory Council

Anderson, A., Vice President
Alaskco U.S.A., Ltd.
P.O. Box 516
Juneau, Alaska 99801

Berry, D., Executive Director
Alaska Municipal League
Municipal Building
Juneau, Alaska 99801

Shoup, D., Alaska Manager
Association of Pacific Fisheries
P.O. Box 1625
Juneau, Alaska 99801

Dickey, D., General Manager
Alaska State Chamber of Commerce
208 National Bank of Alaska Building
Juneau, Alaska 99801

Johnson, James A.
General Sales Manager
Alaska Coastal Airlines
Number 2, Marine Way
Juneau, Alaska 99801

ARIZONA

John R. Williams, Governor

Designated Agency

Dr. F. Pendleton Gaines
Dean of Continuing Education
University of Arizona
Tucson, Arizona 85721

STS Working Contact

Mr. John M. Little, Coordinator
State Technical Services
Office of Continuing Education
University of Arizona
832 E. Speedway
Tucson, Arizona 85721

Chairman, Advisory Council

Mr. Kenneth R. Geiser
6112 E. Quartz Mt. Road
Scottsdale, Arizona 82521

Members, Advisory Council

Aycock, Darwin H.
3140 N. 20th Street
Phoenix, Arizona 85016

Braley, Ian
Professor of Industrial Education
Northern Arizona University
P.O. Box 4045
Flagstaff, Arizona 86001

Brown, Jr., Thomas R., President
Burr-Brown Research Corp.
International Airport
Tucson, Arizona 85706

Carnes, James O.
1732 N. Fort Valley Road
Flagstaff, Arizona 86001

Dow, Allison C.
Pima County Highway Dept.
2334 E. Fifth Street
Tucson, Arizona 85719

Friedman, A.A., Manager
Pima Mining Company
P.O. Box 7187
Tucson, Arizona 85713

Johnson, Kenneth
Valley National Bank
Tucson, Arizona 85719

Knickerbocker, James L.
Tucson Gas & Electric Co.
P.O. Box 711
Tucson, Arizona 85702

Lee, Thomas L.
Deputy Superintendent
Tucson School District No. 1
1010 E. 10th Street
Tucson, Arizona 85719

Loftus, Robert R., Manager
New York Life Insurance
First National Bank Bldg. No. 207
Prescott, Arizona 86301

Lowry, M. M., President
Lowry and Sorenson Engineering Co.
2535 W. Camelback Road, 2A
Phoenix, Arizona 85017

McLean, Sr., Claude E.
Arizona Testing Laboratories
323 W. Virginia Avenue
Phoenix, Arizona 85003

Lindner, Jr., Milton O.
P.O. Box 8
Clarkdale, Arizona 86324

Parkinson, Bruce, Administrator
Unemployment Compensation
Division
1920 West Madison
Phoenix, Arizona 85005

Smith, Lawson V., Vice President
Mountain States Telephone &
Telegraph Co.
16 W. McDowell Road
Phoenix, Arizona 85003

Warren, Morrison F., Principal
Booker T. Washington School
1209 East Jefferson
Phoenix, Arizona 85034

Watkins, Jr., Ralph A.
602 Monroe Avenue
Buckeye, Arizona 85326

Whiting, Bryant
Springerville, Arizona 85938

Willen, Paul
23rd & Engler Avenue
Yuma, Arizona 85364

ARKANSAS

Winthrop Rockefeller, Governor

Designated Agency

Dr. Barton A. Westerlund,
Director
Industrial Research and
Extension Center
University of Arkansas
Technology Campus, P.O. Box 3017
Little Rock, Arkansas 72203

STS Working Contact

Mr. Daniel B. Howard, Manager
Business and Technical Services
Industrial Research and Extension
Center
University of Arkansas
Box 3017
Little Rock, Arkansas 72203

Chairman, Advisory Council

Mr. Lee Roy Beasley
200 Jefferson Avenue
El Dorado, Arkansas 71730

ARKANSAS—Con.

Members, Advisory Council

Bass, Warren K., CPA
E. L. Gaunt & Company
Pyramid Building
Little Rock, Arkansas 72201

Boesch, Jr., Lloyd J.
Technical Superintendent
Monsanto Company
P. O. Box 231
El Dorado, Arkansas 71730

Bowen, William H., Attorney
Smith, Williams, Friday & Bowen
Boyle Building
Little Rock, Arkansas 72201

Cantrell, Frank W.
15 Beverly Place
Little Rock, Arkansas 72207

Carter, Lester C.
Executive Vice President and
General Manager
The Arkansas Rice Growers
Cooperative Assn.
P. O. Box 681
Stuttgart, Arkansas 72160

Davis, Lawrence A., President
Arkansas AM&N College
Pine Bluff, Arkansas 71601

Engstrom, Harold J.
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APPENDIX G: TECHNICAL SERVICES PROJECTS SUPPORTED UNDER STATE PROGRAMS, FISCAL YEAR 1968

ALABAMA

1. A Technical Information Project for Wood Products Processing Firms: six one or two-day short courses, four off campus, for owners and managers of wood products processing plants covering subject matter on wood drying, glues, laminates, new manufacturing processes, residue utilization, materials handling, plant layout, operations research and long range planning; Auburn University, Auburn.

2. Seminars of Recent Developments in Chemical Engineering Technology: four two-day short courses designed to upgrade and update the technology of practicing chemical engineers in computer programming, transport theory application, process control, and information retrieval; Auburn University, Auburn.

3. An Educational Television Project in New Industrial Control Instrumentation Systems: thirty one-half hour lectures will be presented on statewide educational television directed toward staff and plant engineers responsible for designing modifying and purchasing control systems and covering material on circuit theory, electromagnetic transducers, electromagnetic energy convertors, solid state electronics and systems analysis; Auburn University, Auburn.

4. Film Library Service for Industry and Business: a library of technical films will be maintained and will be available on loan to the business and industry of the State and the educational institutions serving industry's technical needs; Auburn University, Auburn.

5. Reference Service of Scientific and Technological Expertise: compiling, maintaining, and updating a list of consultants, college and university faculty, and engineering and scientific personnel in industry and research organizations who will be available to industry seeking assistance in solving problems of a nature which is outside its inhouse competence; Auburn University, Auburn.

6. Dissemination of Technical Information to the Apparel Industry: sixteen symposiums, short courses and conferences from one to five days in length designed to update supervisory personnel in the apparel industry and closely related industries in current and newly created technological practices covering subject matter such as application of simulation to inventory control systems, fundamentals of work sampling, applications of linear programming to materials control engineering, computer technology, analysis of variance, new innovations in work simplification and technology related to the Per-Ma-Creese process; Auburn University, Auburn.

7. New Technical Information for Application in the Metals Industry: sixteen one-day seminar - demonstration sessions for the management of metals producers and manufacturers in Alabama covering subject matter on casting, welding, heat treating, stamping, machining, cleaning, coating and bonding and metallurgical testing procedures; Auburn University, Auburn.

8. Management Science for Alabama's Industries: two forty-hour and five sixty-hour courses for managers and professional staffs in Alabama's small and medium sized industries designed to enable them to use modern tools and techniques for controlling and allocating resources in an optimum manner and covering subjects concerned with statistical quality control, design of experiments, simulation models, inventory systems, linear programming, and sequencing and queing models; University of Alabama, University.

9. Technical Seminars for Alabama Industry: a one-day seminar for plant managers and technical directors of clay products manufacturing plants covering new technology in the industry and covering subject matter on automatic hacking equipment, packaging of heavy clay products, fast firing, characterization of raw materials, surface finishing of clay products and raw material handling; Southern Research Institute, Birmingham.

ALASKA

1. Technical Field Services: field services conducted by five development specialists operating in separately assigned fields; Department of Economic Development, Juneau.

2. Technical Services Conferences: one-day public information conferences in selected cities

to stimulate industry interest in the technological aspects of the fishing, timber, wood products, mining and petroleum industries and tourism and tourist facilities; Department of Economic Development, Juneau.

3. Administration: administration and coordination of the overall technical services program for the State of Alaska; Department of Economic Development, Juneau.

ARIZONA

1. Administration and Coordination of the Arizona State Technical Services Program: administration by a qualified professional of the overall technical services program for the State of Arizona including coordination of educational projects at the various participating institutions; University of Arizona, Tucson.

2. Field and Information Services: field services by full time field agents to assist business and industrial firms in identifying and solving technologically based problems, information services to industry using the Science Division of the University of Arizona Library as a "switching center" between individual business firms and the sources of scientific and technological information and dissemination by direct mailing of technical information to business and industrial firms; University of Arizona, Tucson.

3. Managerial Skills for Engineers: a seminar consisting of ten sessions to provide engineers in the Tucson area with technology intended to improve their managerial skills; University of Arizona, Tucson.

4. Managerial Skills for Engineers: same content and objectives as No. 3 (above) except it will be offered to engineers in the Yuma area; University of Arizona, Tucson.

5. Solid Wastes: a one-day seminar to provide the latest technical information to practicing architects and engineers regarding the disposal of solid wastes with minimum air and water pollution; University of Arizona, Tucson.

6. Soil and Rock Mechanics: a seminar consisting of eight lecture and demonstration sessions to provide practicing engineers with the latest technology regarding principles and practices in soil mechanics; University of Arizona, Tucson.

7. Roads and Streets: a two-day conference to provide consulting engineers and engineers engaged in the construction industry with the state-of-the-art technology relevant to planning and construction of roads and streets in the Arizona environment; University of Arizona, Tucson.

8. Seminar on Computer Skills for Engineers and Managers: a seminar to demonstrate to operating engineers and to lower and middle management personnel of technically oriented firms how computers may be most effectively used in solving a wide variety of engineering and management problems; Arizona State University, Tempe.

9. Graphic Arts Seminar: a seminar to provide technical and management personnel in the lithographic industry with information on new techniques and processes and their practical applications; Arizona State University, Tempe.

10. Seminars on Managerial Skills for Engineers: seminars to acquaint the industrial manager and engineer in the Phoenix area with the sources of information necessary for administrative decisions, current methods and techniques for the effective control of manufacturing enterprises, and the application of new mathematical and technical approaches that can aid in solving managerial problems; Arizona State University, Tempe.

11. Concrete Technology Workshop: a workshop to acquaint technical and management personnel in the construction industry with new technical developments in the use of concrete, properties of concrete, selection and design of concrete mixtures, concreting during hot and cold weather, and future applications for concrete; Northern Arizona University, Flagstaff.

ARKANSAS

1. Field Services: to provide Arkansas businessmen with competent analysts who will identify and define technical problems and recommend sources to which the businessmen may refer for solutions to their problems with the long-range objective of the field service project being the encouragement of businessmen to seek and implement solutions to their problems through the utilization of the latest scientific and technological techniques and information; University of Arkansas, Little Rock.

2. General Coordination, Organization and Operation of Educational Programs: to plan educational activities, schedule dates, arrange meeting places, contact and obtain services of competent and qualified speakers, prepare and supervise distribution of publicity materials, prepare materials for participants, review materials and outlines of speakers,

receive and acknowledge registrations, evaluate speakers performance, visit industry leaders to determine program priorities, collect, code and document use-rate data, participate in field service visits and disseminate information in specialized areas of expertise; University of Arkansas, Little Rock.

3. An Introduction to Applied Industrial Statistics: two three-day seminars for industrial engineers covering topics on the concept of variation, measures of central tendency and variation, the concept of probability, the hypergeometric distribution, poisson distribution, normal distribution and industrial applications; University of Arkansas, Little Rock.

4. Techniques of Plant Layout: a three-day workshop for manufacturing department managers and industrial engineering personnel covering topics on two-dimensional templates, models, materials handling equipment, time and motion implications of plant layout, line or product departmentalization, and process or functional departmentalization; University of Arkansas, Little Rock.

5. Inspection and Quality Control: two two-day workshops to acquaint managers responsible for quality control with new concepts and techniques of inspection and quality control using process control charts and acceptance sampling techniques; University of Arkansas, Little Rock.

6. Computer Application Feasibility: three two-day workshops for managers of firms who require substantial quantities of data to be frequently and rapidly processed; topics to be covered include the introduction to EDP equipment, techniques for determining feasibility of converting non-computerized data procedures, examples of computerizing previously non-computerized activities and sampling problems to be worked on by participants; University of Arkansas, Little Rock.

7. Industrial Applications of New Synthetic Materials: a three-day seminar for managers and staff technicians who have responsibilities in the areas of packaging, product development, and production processing; properties of new synthetic materials will be considered as they have application as packaging material, protective coating, preservative and insulation; University of Arkansas, Little Rock.

8. Matrix Analysis of Structures: one three-day seminar for technical personnel with structural design backgrounds from engineering, architectural, construction, and some manufacturing firms in the fabricating industry; topics presented will include a review of basic matrix algebra, loading conditions, truss analysis, rigid frame analysis, composite structures, and use of digital computers; University of Arkansas, Little Rock.

9. Critical Path Method: a three-day seminar will present the critical path method as it relates specifically to the construction industry in Arkansas; topics will include an introduction to CPM, evaluation of competitive bid strategy methods, the resource scheduling problems, the limited resource problem and the staged decision theory, extension of CPM through the application of integer programming, and the use of computers; University of Arkansas, Little Rock.

10. Foundation Engineering: a three-day seminar for technical supervisors and managers from the residential and commercial construction industry will be presenting the latest information and technology covering numerous aspects of foundation engineering specifically covering topics concerned with soil sampling, problems on clay, sand and rock foundations, climate and its effects on foundations, piles and spread footings, settlements, stability of slopes, and retaining wall pressures; University of Arkansas, Little Rock.

11. Non-Destructive Testing for Industrial Quality Control: a one-day seminar for supervisors concerned with product testing and quality control situations in which conventional testing procedures involve partial or total destruction of the sample product with topics to be discussed including ultrasonic, eddy current, radiographic, x-ray television and infrared microscope techniques; University of Arkansas, Little Rock.

12. Industrial Safety Engineering: a two-day seminar for industrial safety personnel, plant managers and supervisors to consider, in the design of industrial equipment, the hazards inherent in new technology such as radioactive materials, new chemicals, high energy sources and high rotational speed equipment; University of Arkansas, Little Rock.

13. Modern Techniques in Welding: two two-day seminars for supervisory personnel from a wide range of industrial classifications with common requirements for the latest information concerning welding technology; topics will include manual arc, automatic arc, electron beam laser, plasma arc, flame, pressure ultrasonic welding, thermal cutting, arc physics and heat flow; University of Arkansas, Little Rock.

14. Information and Referral Service: a service designed to gather and disseminate technological information of interest to the business, commerce and industry of Arkansas; also provides a referral service to identify sources of engineering and other scientific expertise that can be brought to bear upon scientific and technologically based problems uncovered by the field service agents; University of Arkansas, Little Rock.

15. Administration of STS Program: for the administration of Arkansas annual technical services programs in accordance with the five-year plan and rules, guidelines and regulations promulgated by the Office of State Technical Services, University of Arkansas, Little Rock.

CALIFORNIA

1. Research and Development Review: series of thirty-nine one-hour educational television programs on selected scientific and technical topics designed to present recent technological developments to business and industry; KCET Community Television, Los Angeles.

2. Innovations: series of thirty-nine half-hour educational television programs designed to stimulate the process of technology transfer by presenting panel discussions on the applicability of new technology to business and industry; KCET Community Television, Los Angeles.

3. Packaging Documentation and Information Service: development of a specialized library reference service for the packaging industry with emphasis on food packaging. Collection will consist of industrial publications, government reports, periodicals, monographs, laws and regulations, patents, and other related materials; University of California, Food Protection and Toxicology Center, Davis.

4. Wood Machining Seminar: a two-day seminar to provide research leaders and production management personnel of western forest industry firms with information leading to reduced saw kerf and planing allowances with resultant greater recovery of product and reduced waste disposal and air pollution costs; University of California, Richmond.

5. Proceedings of Wood-Plastic Materials Combination Seminar of June 9, 1967: preparation, publication and distribution to industry the proceedings of the subject seminar; State Office of Atomic Energy Development and Radiation Protection, Sacramento.

6. Continuing Education Courses in The Use of Technical Information: a series of fifty classes consisting of twenty-four symposiums and twenty-six courses of twelve sessions each to present guides to scientific and technical information for business, industry and commerce on such subjects as communications through the use of synchronous satellites, metal forming, technical developments in the clothing industry, research utilization, wood fiber technology, lasers in medicine, ceramics, and oceanology; University of California, Los Angeles.

7. Enrichment of the State Library's Technical Information Center: enrichment of the resources and services of the State Library to business and industry by providing expanded information and access to business and industry, consultant services, research and planning in the field of service to business and industry, advice to libraries on specialized training aids available to business and industry in the field of technology and publication of promotional material to encourage more widespread use by business and industry of the information resources available to them through the State Library and related and contractual libraries; The California State Library, Sacramento.

8. Administration of the State Program: preparation, coordination and administration of the State Technical Service program by a full time Director and part time clerical and financial assistants; California Business and Transportation Agency, Sacramento.

COLORADO

1. Technical Reference Center: provides a continuing coordinated service for collecting and disseminating scientific and technical information to Colorado business and industry and includes reference services, loan and photocopy services, referral service, a literature searching service and publication of a newsletter; University of Colorado, Boulder.

2. Inventory of Technical Expertise: listing of engineers, management consulting firms, market research firms and other sources of technical, scientific and management expertise available to Colorado business and industry; University of Colorado, Boulder.

3. Field Services for the Electronics Industry: specialized field services for electronics firms including dissemination of technical information, development of educational and information services, referral services and problem

identification; University of Colorado, Boulder.

4. Field Services for Industries Other Than Electronics: field services for small and medium sized industries other than electronics providing identification of technical problems, dissemination of technical information, coordination of educational programs with industrial needs and referral services; Colorado State University, Fort Collins.

5. Field Services for Industries in Denver Metropolitan Area: field services directed to such specialized areas as materials science, metallurgy, digital logic, control systems, concrete structures, chemical processing, reliability engineering and heat transfer to provide industries in the Denver metropolitan area technical problem identification, referral services, dissemination of technical information and determination of continuing educational needs; University of Denver, Denver.

6. New Analytical and Testing Techniques for The Mineral Industry: a five-day seminar and industrial workshop to introduce supervisory personnel in the mining industry to new analytical and testing techniques for evaluating samples collected from mining districts, mining operations and smelting operations; Colorado School of Mines, Golden.

7. Administration: planning, coordination and administration of the State program by a full time Administrator with part time clerical and accounting assistance; Colorado Division of Commerce and Development, Denver.

8. Industrial Newsletter, "Progress News": expansion of an existing monthly industrial newsletter to include services available to the business and industrial community through the STS program and expansion of the distribution to provide more widespread coverage of businesses; University of Colorado, Boulder.

9. Seminar in Production Scheduling and Control: a seminar to increase the capabilities of industrial managers in scheduling and controlling production through introduction to the latest technology in pre-planning, development of the master schedule, production planning and control in different manufacturing systems, production inventory planning, scheduling and control concepts and techniques and control of costs; Colorado State University, Fort Collins.

10. Expansion of Project Colorado SURGE: expansion of an existing graduate level experimental program to offer not-for-credit courses of a scientific and engineering nature through video-tape at industrial locations; Colorado State University, Fort Collins.

CONNECTICUT

1. Central Technical Services Referral System: continued growth of a referral system including developing referral inventories, promoting use of the system, and responding to requests; University Research Institute of Connecticut Inc., Wallingford.

2. Field Liaison Service: provide a field liaison service between the designated agency, participating institutions, and all segments of business, commerce, and industry to ascertain needs that relate to available services and resources; Connecticut Development Commission, Hartford.

3. ETV Technology Information: employ the medium of educational television in the process of disseminating technological information to Connecticut's industry, including twelve programs on such subjects as avaliable technical information services, materials research results, and other technology-oriented subjects; Connecticut Educational Television Corporation, Hartford.

4. Technology Information Location Service: locate and provide scientific and technical publications and references; Connecticut State Library, Hartford.

5. Technical Information Service - Joining and Coating of Materials: develop a technical information service in the field of joining and coating of materials, and disseminate this information to Connecticut metallurgy and metal-forming industries; New England Research Applications Center, Storrs.

6. Metal Technology Changes - Metalworking: identify the major technological changes that will have an effect on the metal-working industry during the next decade and facilitate the introduction of change into manufacturing operations; University of Connecticut, Storrs.

7. Frontier Technology Seminars: identify fields offering growth and product diversification opportunities for Connecticut's industry and convey the latest technological state-of-the-art to the State's industry via a seminar series; University of Connecticut, Storrs.

8. New England Regional Program: Connecticut portion of administration and implementation of a regional technical services program for six

New England States; New England Center for Continuing Education, Durham, New Hampshire.

9. Administration: administration, planning, and coordination of the overall technical services program for the State of Connecticut; Connecticut Research Commission, Hartford.

DELAWARE

1. Technical Information Service: operate a technical information service for the dissemination of technology and scientific results to management and supervisory engineers in industry, business and commerce; University of Delaware, Newark.

2. Technical Counseling Service: a field service to provide management of firms, companies, and professional entities with knowledge of technology utilization courses, pollution control seminars and a current technology seminar for engineers; University of Delaware, Newark.

3. Technical Courses and Seminars: five projects consisting of a technology of construction conference, technology utilization workshop for small firms, technology utilization courses, pollution control seminars and a current technology seminar for engineers; University of Delaware, Newark.

DISTRICT OF COLUMBIA

1. Directory of Scientific and Engineering Personnel: publication listing fields of interest of scientific and engineering personnel in the Washington area available for referral and counseling; Metropolitan Washington Board of Trade, Washington, D.C.

2. Institutes for Construction Technology: ten one day institutes on the science of soil mechanics; technology of super-structures; science of land planning, design and technology; residential structure technology; new developments in utility design; new tools and equipment; noise control; new developments in temperature and light control; and use of new basic materials in construction; American University, Washington, D.C.

3. Structural Analysis by Computer Methods: five-day short course for structural engineers on the application of matrix and computer methods in dynamic structural analysis; Catholic University, Washington, D.C.

4. Application of the Critical Path Method to the Light Construction Industry: two two-day seminars for construction firm management to enable them to apply CPM for operational improvement of building methods; American University, Washington, D.C.

5. Technology of Rehabilitation of Housing: a two-day seminar for building and manufacturing management to review new applications of technology to the rehabilitation of housing methods, processes, and innovations; American University and National Association of Home Builders, Washington, D.C.

6. Technology Seminar for the Small Businessman: introduce and encourage the more effective application of technological information in Washington, D.C. industry, commerce, and business; Howard University, Washington, D.C.

7. Workshops in Technology for the Owner/Manager of Small Businesses: provide technical information and services designed to encourage the owner/manager of both new and established small businesses to apply pertinent aspects of science and technology; Southeastern University, Washington, D.C.

8. Ninth Annual Small Business Institute -- A Technology Seminar for the Owner/Manager: provide a forum for the owner/manager of new and established small businesses to learn about the new technologies which should be having an impact on his particular business; George Washington University, Washington, D.C.

9. Administration: administration, planning and coordination of the overall technical services program for the District of Columbia; Consortium of Universities, Washington, D.C.

GEORGIA

1. Current Register of Scientific, Engineering and Management Manpower: a compilation of persons in Georgia with specific technical qualifications who could normally be considered available for consultation and includes faculties and research staffs of educational institutions, research laboratories and consultants with information processed by EDP equipment with printouts showing grouping by subject area of specialization and institution; the register is available to any qualified user upon request; Georgia Institute of Technology, Atlanta.

2. Application of Computer Technology to Inventory Control, Decision-Making, and Mathematical Programming in Business: a field

service program and the selective disseminating of pertinent articles for management using full-time technical services representatives to demonstrate the applications of computer technology and to provide technical information on how this technology can be introduced efficiently and effectively with particular attention given to the application of computer services to inventory control, decision-making and mathematical programing; University of Georgia, Athens.

3. A Demonstration of Operations Research Methods in Sawmilling: a demonstration project using visits to mills, seminars and workshops for the benefit of mill managers and technical people concerned with implementing and maintaining operations research systems with subject matter including estimated costs of benefits to be gained by the introduction of this technology; University of Georgia, Athens.

4. Application of Finger Jointing Technology to Flooring Products: a field visitation project for flooring plant managers, production supervisors and quality control technicians with subject matter to include technology relating to the shaping and gluing of finger joints as applied to oak flooring shorts and the evaluation of the economics of upgrading flooring joints by end joining into longer lengths; University of Georgia, Athens.

5. Seminar on the Design and Use of Laminated Wood Construction Systems: a two-day seminar for architects, design engineers and architectural consultants for a review of new developments in the use of laminated wood structural members and covering fabrication, erection, anchorage, protection, finishing and jointing; University of Georgia; Athens.

6. Technical Information Transfer Services for Georgia Business and Industry: a field liaison services designed to inform all business and industrial firms in the State of the STS program, to prepare profiles of the technical need and interests of those firms which choose to participate in the program, and to respond to the expressed and identified needs of the participating companies for scientific and technological information; Georgia Institute of Technology, Atlanta.

7. Fire Retardant Coatings and Their Applicability in Furniture Plants: a technical review of the latest information on fire retardant coatings and treatments including availability application, performance characteristics and relative costs will be prepared and published and made available to furnish plant managers, purchasing agents and to representatives of other industries using flammable coatings and materials; University of Georgia, Athens.

8. Scientific and Technical Information Conferences for Georgia Business: a series of ten three-day conferences designed to update middle and upper management personnel of the State's firms in two areas: the first area will consist of topics dealing with the technical processes, machinery and layout of operations as may be identified by physical scientistis and other specialists participating in the project; and the second area will cover topics in the management science field including modern quantitative techniques developed for the more precise management and control of business operations; University of Georgia, Athens.

9. A Scientific Management Oriented Training Program on Quantitative Decision Making Techniques, Principles, Methods and Concepts: four three-day seminars for managers in business and industry to acquaint them with some of the latest quantitative techniques of modern management science, cover topics on industrial dynamics, linear programming, statistical correlations, inventory control and forecasting and program evaluation and review techniques; Georgia State College, Atlanta.

10. Application of Hot Melt Adhesives in Furniture Assembly Operations: production-line evaluation and demonstration of the applicability of hot melt assembly systems, and a seminar to acquaint management with their potential value and in-plant assistance in adapting hot melt technology to specific operations; University of Georgia, Athens.

11. Administration: administration, planning and coordination of the overall technical services program for the State of Georgia; Georgia Board of Regents, Atlanta.

HAWAII

1. Hawaii Technological Information Center: a center to assist Hawaii business and industry in the recognition and formulation of problems that are hindering their growth and to provide selected scientific and technical information to them to assist in the solution of their problems; Department of Planning and Economic Development, Honolulu.

2. Hawaii Business Information Institute: an information, reference and bibliographic service to small and medium sized businesses and industries with information on new scientific and technical knowledge resulting from pure

and applied research in the physical, biological, social and computer sciences; Chaminade College of Honolulu.

3. Seminars for Engineers in Practice: a series of eight weekly seminars to enable practicing professional engineers to understand and use newly developed technological material in a wide variety of subjects to more effectively cope with the technological demands of business and industry; The University of Hawaii, Honolulu.

4. Administration: planning, coordination and administration of the State Technical Services program are conducted by a program manager, on a part time basis, with clerical and accounting staff assistance; Department of Planning and Economic Development, Honolulu.

ILLINOIS

1. Computer Technology for the Building Industry: experimental use of a computer by contractors and consulting engineers, including a short course on computer utilization; University of Illinois, Urbana.

2. Quality Control by Photogrammetric Measurements II: the second phase of an intensive program designed to demonstrate the utilization of photogrammetric data acquisition methods in quality control applications in industrial plants; University of Illinois, Urbana.

3. Technical Services for the Wood-Using Industry: a comprehensive program of technical services, information dissemination, field visits and short courses to upgrade the technical competence and improve the economic level of some 800 Illinois secondary wood-using industries; University of Illinois, Urbana.

4. Industrial Wastes Treatment: a three-part series of one day conferences, laboratory demonstrations, and in-plant evaluation on the methods of testing, evaluating and treating industrial waste products, new techniques to be demonstrated include carbon adsorption, resin adsorption, and low energy oxygen transfer techniques; Southern Illinois University, Carbondale.

5. Computer Technology for Small and Medium Sized Firms: a two part, three day seminar covering computer applications in management system analysis and engineering system analysis, advantages and disadvantages of analog and digital computers and future indications will be presented; Southern Illinois University, Carbondale.

6. Auto-Instructional Material in Numerical Control Technology for Industrial Applications: development of organized instructional material to assist the small and medium sized industrial firms in the application of automated manufacturing equipment; Northern Illinois University, Dekalb.

7. Administration of the State State Technical Services Program: performed by a qualified professional with responsibility for coordination and administration of the state-wide program; Department of Business and Economic Development, Springfield.

IOWA

1. Middle Management Seminars: a series of eight seminars for engineers and scientists with managerial responsibilities stressing the relationship of scientific competence and technological skills to the economic, sociological, and legal environment; University of Iowa, Iowa City.

2. Time and Method Analysis Conference: a five-day program with laboratory practice sessions for motion and time study, methods analysis and other technical personnel on the processes of engineering operations evaluation stressing the occupational market and work environment; University of Iowa, Iowa City.

3. Pharmacy Seminars: Two combination seminars and workshops for professional registered pharmacists on the utilization of EDP for drug information, poison control records, inventory control and procurement, and on the patient-pharmacist relations in the dispensing of isotopes and isotopic compounds used in modern drugs; University of Iowa, Iowa, City, and Drake University, Des Moines.

4. Water Works Short Course: a two-day short course for operation, distribution and management personnel, State health officials, and consulting engineers on the advances and changes in design, operation and distribution in water works; University of Iowa, Iowa City.

5. Advanced Water Works Operators Conference: a three-day conference for water plant supervisors and managers on the methods of identifying and combating problems caused by the useage of pesticides, herbicides, and chemical irradicators and compounds; University of Iowa, Iowa City.

6. Advanced Water Pollution Control Operators Conference: three-day conference for sewage

plant supervisors and managers on the methods of identifying and combating problems caused by the use of pesticides, herbicides, and chemical irradicators and compounds; University of Iowa, Iowa City.

7. Methods-Time-Measurement Conference: a fifteen-day program for industrial engineers and managers on the current developments and applications of predetermined time standards; Iowa State University, Ames.

8. Plastics Conference: a two-day conference for small manufacturers and users on product development, manufacturing methods and problems of plastic fabricating equipment, processes and techniques; Iowa State University, Ames.

9. Critical Path Scheduling Seminar: a two-day program for engineering and management personnel covering the basic requirements and potential applications of critical path schedulling in industrial organizations; Iowa State University, Ames.

10. General Purpose Data Seminar: a four-day seminar for industrial engineers and managers on the current developments and applications, including computerization of G.P.D.; Iowa State University, Ames.

11. Linear Programming of Physical Distribution: a two-day seminar for engineers, managers, and consultants on the application of mathematical techniques utilizing a computer on the problems of physical distribution of products; Iowa State University, Ames.

12. Dissemination of Technical Information: a program of comprehensive personal review and mailing of specific types of information to business and industry in Iowa; Center for Industrial Research and Service, Ames.

13. Selective Dissemination of Information: a pilot program for the application of a computer for selective review and mailing of information to business and industry in Iowa; Center for Industrial Research and Service, Ames.

14. News for Iowa Industry: a bimonthly publication mailed to over 7000 companies and individuals covering such topics as continuing education, production information, engineering trends, and other technical information; Center for Industrial Research and Service, Ames.

15. Computers in Banking: two one-day seminars for top-level personnel of financial institutions on the application of computers and EDP equipment for operations and service to customers; Univ. of Northern Iowa, Cedar Falls.

16. Computers in Commercial Banks: a one-day seminar for executives of commercial banks utilizing computers in their operations to present the latest developments and long-range forecast of computers and bank operations; Univ. of Northern Iowa, Cedar Falls.

17. Electric Utility Computer Seminar: a one-day seminar for engineering and technical personnel of utility companies on equipment and techniques available for computer applications in such areas as distribution plant loading, load dispatching, and customer services; Univ. of Northern Iowa, Cedar Falls.

18. Industrial Science Computer Seminar: a one-day program for executives and top management personnel on the applications of computers in the decision-making process, includes discussion of such topics as decision-choice techniques, linear programming, information retrieval, forecasting methods, capital investment, and simulation techniques; Univ. of Northern Iowa, Cedar Falls.

19. Electronic Data Processing Workshop: a five-day workshop in cooperation with the American Institute of Certified Public Accountants for CPA's on the application of EDP equipment in all phases of cost control, accounting, and billing procedures; Drake University, Des Moines.

20. Quality Control Short Course: a ten-week program for managers, engineers, supervisors and laboratory technicians on improved method for quality control, including probability studies, control charts, acceptance sampling, and reliability; Drake University, Des Moines.

21. Management Information Systems: a one-day seminar for business executives on the application of EDP to the business environment, including the problems created by automation, and the economic, psychological, and sociological considerations of EDP; Drake University, Des Moines.

22. Industrial Pollution Seminar: a five-day seminar for engineering management and manufacturers on the growing problems of industrial air pollution and the economic, technological and mechanical considerations of solutions to this problem; Iowa Wesleyan College, Mt. Pleasant.

23. Production Control Seminar: a two-day seminar for inventory and production analysis

personnel on the applications and use of computers, including computer programming, absolute coding, software routines and techniques; Clarke College, Dubuque.

24. Numerical Methods for Industrial Experimentation: a two-day seminar for computer operations personnel on machine functions and capabilities in the area of numerical methods analysis, industrialization programming and simulation of problematical series used in actual operations; Clarke College, Dubuque.

25. Industrial EDP Seminar: a one-day seminar for industry and business executives on the basic principles, applications, machine functions, capabilities, telecommunications setups, hardware features and requirements; Morningside College, Sioux City.

26. Vibration Seminar: a four-day seminar for practicing engineers on the fundamentals of vibration theory for one, two-and multi-degree of freedom vibration systems, including computer solutions and effects of natural frequencies; University of Iowa, Iowa City.

27. Administration: administrative services and support for the Iowa State Technical Services program including coordination of the public information program; Center for Industrial Research and Service, Ames.

28. Industrial Engineering Workshop: a one-day workshop for industrial engineers and technicians on the applications of such techniques as PERT, management engineering, master standard data, general purpose data and work simplification; Iowa State University, Ames.

KANSAS

1. Kansas Industrial Extension Service and Field Offices: a coordinated system consisting of a centralized State center and regional field offices serving business, industry, and commerce by providing liaison between institutions and industry to determine problems, and to develop and provide other technical services on a state-wide basis; Kansas Industrial Extension Service, Kansas State University, Manhattan.

2. Expertise Rosters: development and maintenance of a set of rosters of research scientists, consulting engineers, university specialists, special facilities and services, and a tabulation of financial assistance to businesses and industry; Research Foundation of Kansas, Topeka.

3. Information Services: a bi-monthly newsletter serving business, industry, and commerce by disseminating scientific and technological information and responding to specific inquiries generated by the newsletter and by contacts made through the field service program; Kansas Industrial Extension Service, Manhattan, and the Research Foundation of Kansas.

4. Workshop on Design and Analysis of Aircraft Structures: a thirty-session course serving the aircraft industry, covering fundamentals of analysis and design, engineering mechanics, mechanics of materials and engineering graphics; Wichita State University, Wichita.

5. Public Information Program: a coordinated program designed to create awareness and understanding of technical and scientific programs offered in Kansas through the preparation of brochures, lecture presentations, and distribution of articles to newspapers and periodicals; Research Foundation of Kansas, Topeka.

6. Administration of State Technical Services Programs: performed by a qualified professional with responsibilities for overall coordination, administration and fiscal control of the state-wide program; Research Foundation of Kansas, Topeka.

7. Workshop on the Use of Technical Libraries: a series of informational workshops designed to familiarize businesses and industry with the services of technical libraries throughout the State and to stimulate the use of such libraries in identifying technological information; University of Kansas, Lawrence, and the Kansas Industrial Extension Service, Manhattan.

8. Industrial Profiles: a compilation of the scientific and technological interests and needs and a cataloguing of the capabilities of business and industry to further the development of educational and other technical services; Kansas State College of Pittsburg, Pittsburg.

9. Field Services for the Printing Industry: a program to provide technical liaison to the printing industry, including information on educational activities, dissemination of information, planning and conducting special workshops and seminars; Kansas State College of Pittsburg, Pittsburg.

10. Printing Technology Workshop: a series of two two-day workshops on the most recent advances in printing technology, including lithography, camera exposure control, register

control, color proofing, and half tone problems; Kansas State College of Pittsburg, Pittsburg.

11. Urban Technology Seminar: a series of twelve seminars on the systems approach to urbanization as a technological process, including methods for identification and transfer of scientific and technological information for solution of urban problems; Center for Urban Studies, Wichita State University in association with the Brookings Institution.

KENTUCKY

1. Professional Engineering Conferences and Seminars Utilizing Closed Circuit Television: a series of job-related conferences and seminars for engineers in the Louisville area on advanced engineering technology, mechanics, strength of materials, fluid mechanics, heat transfer, electrical engineering and electronics with the subject matter designed to orient the audience to the application of these subjects to industry problems; University of Louisville, Louisville.

2. Greater Louisville Technical Data Collection and Referral Center: a technical information center designed to utilize the resources of a minimum of twenty-five industry technical libraries by providing selective dissemination, search and referral services to the commerce, business, and industry in the Louisville area for the solution of technological and scientifically based problems; University of Louisville, Louisville.

3. New Technical Applications for Land Surveyors: three two-day training sessions for land surveyors to update their knowledge of recent scientific procedures and techniques including subject matter on aerial photography, new technical interpretations in land surveying and surveying calculations using computers with training sessions to be conducted at Lexington, Louisville and one other location; University of Kentucky, Lexington.

4. Information and Analysis Center: a service that will profile the technological needs of small and medium sized business, establish a technological reference library to collect, catalog, store, retrieve, interpret and disseminate technical information to businesses through searches and referrals so as to encourage these businesses to adopt and effectively utilize modern and new technology; University of Kentucky, Lexington.

5. Administration: administrative services and support activities necessary for the day-to-day operation of the Kentucky program, including evaluation of projects and coordination with other agencies; Kentucky Department of Commerce, Frankfort.

LOUISIANA

1. New Developments in Ready Foods for the Restaurant Industry: a one-day conference directed to restaurant and food service managers designed to acquaint them with portion-size menu items known as "ready foods" and to provide some understanding of their production, suitability to commercial food service, and safety precautions for their use; Louisiana Polytechnic Institute, Ruston.

2. A Seminar on the Use of Management Science Techniques For Business Decisions: a two-day workshop for managers from commercial and industrial establishments on the mathematical techniques, such as model building, concepts of probability and discounting theory as applied to making modern business decisions; Louisiana Polytechnic Institute, Ruston.

3. Statistical Quality Control: a two-day workshop for management, production and inspection personnel of industries such as wood products, paper, construction, petroleum, chemical, foundries and aerospace to introduce the use of Shewhart control charts, acceptance sampling systems and procedure and other mathematically derived techniques applicable to quality control; Louisiana Polytechnic Institute, Ruston.

4. Statistical Analysis of Performance Variances for Construction Firms: a four-day seminar for personnel holding higher managerial positions in small and medium sized construction firms in the North Louisiana area to enable them to apply statistical analysis of performance variances so that variances between planned and actual construction can be identified and corrected in future operations; Louisiana Polytechnic Institute, Ruston.

5. Use of Management Science Techniques and Data Processing to Solve Inventory Problem: a three-day workshop for engineers who have administrative positions to acquaint them with operations research applications on inventory problems and the use of electronic computers in inventory control; Louisiana Polytechnic Institute, Ruston.

6. Information Service for Business and Industry with Activities Related to Agriculture: a referral service, field liaison program and a series of short courses and seminars all

designed to inform the agribusiness engineers and managers about new technological developments of practical and immediate value; Louisiana Polytechnic Institute, Ruston.

7. Theory and Application of Transistors and Other Solid-State Devices: a three-day seminar for technical personnel to upgrade their knowledge on the operation and maintenance of solid-state devices; Louisiana Polytechnic Institute, Ruston.

8. Applications of Operations Analysis and Work Simplification: two seminars and a limited field liaison activity for managers and owners of small business on various techniques of work measurement and analysis; Louisiana Polytechnic Institute, Ruston.

9. Basic Computer Sciences: a seminar for engineers, physical scientists and businessmen who wish to gain familiarity with computer oriented problem solving; Louisiana Polytechnic Institute, Ruston.

10. Technical Information Transfer Seminars for Business Management: four seminars each one night per week for eight consecutive weeks for managers in computer applications for scientific management; Louisiana State University, Baton Rouge.

11. Short Course in Optimization: to introduce industrial personnel primarily associated with petroleum and chemical companies to linear and non-linear programming techniques which can be used to optimize a particular production process; McNeese State College, Lake Charles.

12. Hybrid Computation: a short course designed to introduce industrial personnel to the capability and uses of analog and digital computers in solving a variety of industrial problems; McNeese State College, Lake Charles.

13. Hybrid Computer Concepts for Industry: a seminar for engineers designed to develop understanding of the uses of hybrid computers where the analog part of the computer provides the rapid solutions to dynamic problems and the digital part the accuracy and the logic control; Tulane University, New Orleans.

14. Technical Information Center: a facility designed to serve small businesses and industries with answers to scientifically and technologically based problems both on a request and selective dissemination basis; Gulf South Research Institute, Baton Rouge.

15. Automated Information Systems for Industry: a three-day conference designed to acquaint industrial management personnel with the use of computers in information retrieval problems; University of Southwestern Louisiana, Lafayette.

16. Computer Simulation: a three-day conference designed to acquaint middle and top level management from industrial and service organizations with simulation techniques applied to solution of problems in the business field; University of Southwestern Louisiana, Lafayette.

17. Computer Simulation for Industrial Scientific Personnel: a three-day conference designed to acquaint technical management personnel with the construction, utilization and interpretation of results from mathematical models used in the solution of problems by simulation techniques; University of Southwestern Louisiana, Lafayette.

18. Industrial Applications of Radioisotopes: a two-week conference on the industrial applications of radioisotopes including thickness gaging, flaw identification, volume and fluid flow measurements; University of Southwestern Louisiana, Lafayette.

19. Nondestructive Testing and Stress Analysis: a two-week course for technicians and engineers on modern testing principles and methods; University of Southwestern Louisiana, Lafayette.

20. Quality Control Uses in Industry: a conference for five 8-hour days to acquaint technical personnel with the theory and uses of quality control charts and the use of the computer when working with these charts; University of Southwestern Louisiana, Lafayette.

21. Use of Statistics and Computers in Industry: a five-day conference for engineers and supervisory personnel to update their ability to use statistical concepts and electronic computers for the solution of industrial problems; University of Southwestern Louisiana, Lafayette.

22. Use of Time and Motion Study in Small Manufacturing Concerns: a one-week workshop for production managers to investigate the technology and benefits of applying motion and time study to their own environments; University of Southwestern Louisiana, Lafayette.

23. Administration: administration and coordination of the technical services program in the State of Louisiana; Department of Commerce and Industry, Baton Rouge.

MAINE

1. Technical Information Center: provide reference services, literature searches, and

assistance to firms in establishing industrial information services; University of Maine, Orono.

2. Computerized Accounting for Small Business: promote the latest computerized cost accounting systems within small businesses and industries as an aid in developing financial management techniques for improved decision-making; University of Maine, Orono.

3. State-of-the-Art in Civil Engineering: a series of seven seminars on (1) structural steel design, (2) ultimate strength design of reinforced concrete, (3) industrial waste treatment, (4) timber design, (5) foundation design, (6) hydrology, (7) critical path method; directed to the practicing engineer; University of Maine, Orono.

4. Dry Kiln Short Course: a three-day course to improve the competences of dry kiln operators in hardwood and softwood industries in Maine; University of Maine, Orono.

5. Seminar on Corrosion: acquaint contractors and engineers about causes of corrosion and methods of prolonging the service life of metal structures; University of Maine, Orono.

6. Use of Electronic Instruments: a short course to orient engineers with the capabilities and operations of such instruments as the oscilloscope, vacuum tube voltmeters, signal generators, and x-y plotters; University of Maine, Orono.

7. Computer Applications in Mechanical Engineering Design: a one-day workshop illustrating a variety of computer solutions to engineering problems and acquainting practicing engineers with capabilities of computers; University of Maine, Orono.

8. Field Liaison Service: provide field services to determine technological needs of Maine industry, assist in obtaining information on technological advances and advise on potential applications; University of Maine, Orono.

9. New England Regional Program: Maine portion of administration and implementation of a regional technical services program for the six New England States; New England Center for Continuing Education, Durham, New Hampshire.

10. Administration: administration, planning and coordination of the overall technical services program for the State of Maine; University of Maine, Orono.

MASSACHUSETTS

1. Communications Service: announce and distribute to business, commerce and industry new technological information, both in published and nonpublished form; and to build an inventory of referral sources; University of Massachusetts, Amherst.

2. Industrial Innovation Conference: acquaint Massachusetts industry with Federal and State services for technology transfer including those of NASA, SBA, and STS; Worcester Polytechnic Institute, Amherst, and Boston College, Chestnut Hill.

3. Conference on Materials, Materials Processing, and Manufacturing; three-day conference on latest developments and trends in these subject areas; University of Massachusetts, Amherst.

4. Technical Guidance Center for Industrial Water Pollution Control: information and referral service for business, commerce and industry relative to emerging, advanced waste treatment technologies; University of Massachusetts, Amherst.

5. Innovative Technology in Residential Rehabilitation: make available to the construction industry and other audiences up-to-date information on significant technological developments and changes in residential rehabilition; Boston University, Boston.

6. New England Regional Program: Massachusetts portion of administration and implementation of a regional technical services program for the six New England States, New England Center for Continuing Education, Durham, New Hampshire.

7. Internal Counseling Services: provide time of competent counselors to advise on initially vague problems and opportunities, and aid in more precise determination of alternative courses of actions; University of Massachusetts, Amherst.

8. Administration: administration, planning, and coordination of the overall technical services program for the Commonwealth of Massachusetts; University of Massachusetts, Amherst.

MICHIGAN

1. Statewide Technical Services Program: a coordinated statewide system of field service Directors at the following ten participating

institutions for direct person-to-person contact on problem analysis, referral services, information dissemination, and maintenance of directories of expertise to assist industry in the identification and solution of technical problems, to expedite the transfer of specific technology from the university to the industrial complex, and to initiate special workshops, seminars and demonstrations to facilitate the application of technology to business problems: Central Michigan University, Mount Pleasant, Wayne State University, Detroit, Ferris State College, Big Rapids, Western Michigan University, Kalamazoo, Grand Valley State College, College Landing, Northern Michigan University, Marquette, Michigan Tech. University, Houston, Eastern Michigan University, Ypsilanti, Michigan State University, East Lansing, and University of Michigan, Ann Arbor.

2. Seminars on Data Processing Applications for Small Business: two one-day seminars with demonstrations and evening workshops for technical and management personnel on the capabilities of data processing equipment to provide management with operational and technical information in relation to its value in decision making; small business applications and utilization of central service centers will be presented; Central Michigan University, Mount Pleasant.

3. Critical Path Method Applications for the Building Industry: a series of four lecture, demonstration, and workshop sessions for independent contractors, consultants, architects and owners on CPM techniques and applications, computations, and network construction; Northwestern Michigan College, Traverse City and Central Michigan University, Mount Pleasant.

4. Flammability of Polymers: a one-day seminar for plastic manufacturers, processors, fabricators, fire marshalls and other public officials on the flammability characteristics of polymers, the effects of flammability retardance materials, and the effects of smoke and other contaminants of thermo decomposition, includes post-seminar follow-up on direct applications and problems; Wayne State University, Detroit.

5. Workshop on Cold-Type Setting in Printing: a one-day workshop and seminar including demonstrations for printers and supervisory personnel on several cold-type setting systems including the strike on method and the photographic method; Ferris State College, Big Rapids.

6. Thermal Methods of Analysis Workshop: a two-day workshop for laboratory personnel on new analytical techniques and recording instruments for thermal analysis, including differential thermal analysis (DTA) and thermalgravimetric analysis (TGA); Ferris State College, Big Rapids.

7. Techniques of Metal Removal: a three-day workshop for small manufacturing firms on the relationship of tool life to machining variables, includes demonstrations of the latest equipment for electrical discharge machining, three-dimensional contour machining and numerical control; Ferris State College, Big Rapids.

8. Value Analysis Engineering Workshop: a two-phase program consisting of an intensive one-day workshop and extended in-plant visits on the applications of value engineering and value analysis in manufacturing, purchasing and marketing for cost reduction, product improvement and increased efficiency; Western Michigan University, Kalamazoo.

9. Geometric and Positional Dimensioning and Tolerancing: a two-phase program consisting of an intensive one-day workshop and extended in-plant visits on the application of current national standards and accepted practice in dimensioning and tolerancing requirements for products produced under federal contracts; Western Michigan University, Kalamazoo.

10. Computer Applications in Chemical Engineering: a ten-day course for chemical engineers on the applications of digital computers for control of industrial processes, for data reduction, engineering design and for research problems; Michigan Technological University, Houghton.

11. Continuous Forest Inventory Field Techniques: a one-week seminar with actual field demonstrations for timber industry personnel on advanced techniques for continous forest inventory through measurement of a light sample of permanent forest plots coupled with automatic machine analysis of data; Michigan Technological University, Ford Forestry Center; Alberta.

12. Wood Technology Seminar: a series of six one-day meetings for production management personnel on the properties and processing of wood and wood by-products; includes an extended program of in-plant visits on specific problems and applications; Michigan Technological University, Houghton.

13. Seminar on Design Principles and Processing of Plastics: two two-day seminars for chemists, engineers and scientific personnel on recent improvements in plastic technology including microwave and radiation curing, polyester fabricating, reinforcing and applications; Eastern Michigan University, Ypsilanti.

14. Industrial Pollution Seminar: a one-day seminar for industrial firms in all areas of business on the current state and Federal requirements for pollution control, the measurement and detection of pollution, meteorological and environmental conditions affecting pollution and sources of assistance in solving particular pollution problems; Eastern Michigan University, Ypsilanti.

15. Food Processing Seminars: three seminar-workshops for managerial and supervisory personnel from food processing industries on recent developments in pasteurization, irradiation, freeze-drying, canning and dehydration, and the effects of these processes on flavor, nutritive value and wholesomeness of food; Michigan State University, Benton Harbor and Traverse City and Eastern Michigan University, Ypsilanti.

16. Seminar on The Computer and Today's Manager: an intensive one-day seminar presented by nationally recognized authorities on such topics as remote access time-sharing techniques, communications as related to remote computing and the use of small programmable control devices; University of Michigan, Ann Arbor.

17. E.D.P. for Material Control: a one-day conference for upper and middle management and material control personnel on the specific applications of E.D.P. equipment in all phases of material control from purchasing to issuing to reorder quantities; University of Michigan, Ann Arbor.

18. Numerical Control Technology: a two-day program of lectures and demonstrations by leading industrial users on new techniques of numerical control equipment and processes, including five axis machining, computer graphics and remote hookings for numerical control, use of integrated circuits and maintenance requirements; University of Michigan, Ann Arbor.

19. Electrical Engineering Applications to Michigan Industry: a two-day program for upper and middle management personnel from Michigan industry on the latest research activities being conducted in various university laboratories that have potential for industrial development and application; University of Michigan, Ann Arbor.

20. Directory of Michigan Industrial Research Laboratories: a statewide index of research laboratories, research personnel, major areas of expertise, activities conducted and others with interests in research projects and industrial expertise; University of Michigan, Ann Arbor.

21. Bibliography of Precast Concrete Products: to publish and disseminate the results of a previous literature search on the design and use of precast concrete products in buildings; University of Michigan, Ann Arbor.

22. Current Developments in Wood Technology: a series of six lecture-demonstrations on identification and structure of woods, dimensional stability and effects of moisture, physical and mechanical properties and their relation to machining and processing, machining defects, finishing, adhesion on applications; Central Michigan University, Mount Pleasant.

23. Wear and Abrasion Resistance of Plastics: a two-day conference for plastic producers, processors and other users to present latest developments in wear and abrasion resistance, physical and chemical properties, composites, testing and future developments in plastics; Eastern Michigan University, Ypsilanti.

24. Adhesives for the Automotive Industry: a two-day conference for representatives of automotive companies, resin manufacturers and adhesive formulators to present in-depth discussions of present and potential uses of plastics and to define the needs and problems associated with sophisticated uses of plastics in the automotive industry; Eastern Michigan University, Ypsilanti.

25. Industrial Closed-Circuit Television Seminar: a two-day seminar followed by in-plant application discussions on the uses and potential of closed-circuit TV in communications, training, security, information processing and other industrial uses; Western Michigan University, Kalamazoo.

MINNESOTA

1. Administration of STS Program: performed by a qualified professional with responsibility for state-wide coordination and development of the program; State Planning Agency, Saint Paul.

2. Field Services and Information to Business, Commerce and Industry: a staff of field agents to assist in the dissemination of information on new technology and to provide answers to specific problems for firms requesting services; State Planning Agency, Saint Paul.

3. Technical Service Agent Corps: a team of specialists in several fields to analyze problems and needs of commerce, business and industry in the state and to provide assistance in bringing resources to bear in solving problems; University of Minnesota, Minneapolis.

4. Technical Information and Referral Service: a coordinated service utilizing all technical libraries for information screening, storage and retrieval to respond to specific requests from business and industry for information; University of Minnesota, Minneapolis.

5. Minnesota Directory of Manufacturers: a directory of descriptive information about Minnesota industry and commercial enterprises; State Planning Agency, Saint Paul.

6. Discovering and Acquiring Available Technical Information for Industry: an audio-visual program to illustrate the various sources of access to technical information and the means of acquiring the necessary service and assistance; Mankato State College, Mankato.

7. Seminar Programs: a series of technical seminars on such topics as new material developments, noise and vibration control, pollution control, quality control, information systems and computer applications, organic coatings for corrosion control and the industrial application of technical instruments; University of Minnesota, Minneapolis.

MISSOURI

1. Technical Services Management: Combined administration and management of St. Louis University projects and field service activities; St. Louis University, St. Louis.

2. Linear Systems Analysis: twelve, two and one half hour, weekly problem-solving sessions for professional engineers and other engineering personnel concerned with communication theory and application on methods of analysis and synthesis in engineering systems; St. Louis University, St. Louis.

3. Institute for Airport Operators: specialized technical services for small and medium airport operators on information dissemination, educational programs and special services on such topics as communications equipment, aircraft maintenance, weather services, government regulations and services and other new developments; St. Louis University, St. Louis.

4. Systems Analysis and Data Processing: a certificate program for engineering and management personnel on problem-solving through the use of the systems approach and the utilization of electronic data processing equipment; fourteen specific courses are included in the program this year; St. Louis University, St. Louis.

5. Recent Developments in Chemistry: six, two-hour extension courses for chemists and laboratory personnel on new developments in polymer chemistry, including biological and biochemical mechanisms in industrial waste disposal; St. Louis University, St. Louis.

6. Technological Innovation for Management: a combination of one and two-day conferences with short courses for middle and top management on new methods of solving business problems, including application of analytical techniques and computer processing; St. Louis University, St. Louis.

7. Combined Educational Projects: a series of fifteen individual short courses for engineers, chemists and engineering managers on such topics as: Quantitative Microchemical Analysis, Electronic Instrumentation, Operations Research, Entrepreneurship, Programming, Control Systems Engineering and Phase Contacting; Washington University, St. Louis.

8. Physical Inorganic Chemistry Institute: thirty two-hour evening lectures for chemists, engineers, medical scientists and research managers on the most recent developments in the theory of physical inorganic chemistry and a systematic treatment of current knowledge on specific elements of the periodic table; Washington University, St. Louis.

9. Polymer Science and Technology Institute: thirty two-hour evening lectures for chemists and chemical engineers on the structure and properties of polymers, polymer physical chemistry, kinetics of polymerization, reinforced plastics and other developments in polymer science; Washington University, St. Louis.

10. Chemical Instrumentation, Infrared Spectroscopy: a series of fourteen evening lecturers on the application and use of infrared spectroscopy as a qualitative and quantitative method of identifying compounds; Washington University, St. Louis.

11. Chemical Instrumentation, Separation Techniques: a series of fourteen evening lecturers for chemists, biochemists and research workers on the latest techniques of separating chemical compounds, including chromatographic, electrophoresis, dialysis, centrifugation, solvent extraction and molecular sieve; Washington University, St. Louis.

12. Materials Science Institute: a series of 18 evening lectures for engineers and others to review the latest in structural materials and to predict future materials needs in such areas as high performance composites, metal forming methods, welding and brazing and polymeric materials; Washington University, St. Louis.

13. Technical Services Planning and Program Development: a field liaison specialist to plan and develop educational programs for specific industrial needs through field visits and direct person to person contact with small and medium sized business; Washington University, St. Louis.

14. Industrial Referral Services: a state-wide network for inquiry and information services and direct assistance to industrial firms for locating sources of professional expertise for the solution of business problems; University of Missouri, Columbia.

15. Industrial Referral Services Directory: a directory of research and development capabilities of various governmental agencies and universities in Missouri; University of Missouri, Rolla.

16. Technical Counselling Services: an experimental project involving a new type of university-based service to industry by providing limited assistance directly toward the solution of business problems and improvement of operations; University of Missouri, Columbia.

17. Field Services: specialized field services for mining and chemical industries to introduce and explain the State Technical Services program and the services available, to channel inquiries for assistance, and to provide information dissemination and referral services; University of Missouri, Rolla.

18. Computer Programming for Engineers: a one-week program for engineers, technical managers and executives on the capabilities of digital computers in solving complex engineering problems in a variety of industrial applications; University of Missouri, Columbia.

19. Computer Aided Circuit Design: a one-week program for engineers and technical managers on the use of computers and special programs in the design of electrical control and instrumentation systems; University of Missouri, Columbia.

20. Electrical and Chemical Machining Conference: a two-day program for engineers in the metal fabrication industry on the industrial applications of these machining processes in terms of materials, shapes, tolerances and economic considerations; University of Missouri, Columbia.

21. Fluid Amplifier Conference: a two-day conference on the basic theory, principles of operation, development of hardware, and industrial applications of fluidic devices; University of Missouri, Columbia.

22. Scientific Inventory Management: two two-day conferences for industrial managers and technical personnel on the use of digital computers for inventory management; University of Missouri, Kansas City.

23. Work Standards and Design Conference: a two-day program for executives and industrial engineering personnel on recent advances and developments in the area of work design, integrated standards and layout systems, and numerical control and work standards; University of Missouri, Kansas City.

24. Fluid Flow Workshop: a five-day workshop supplemented by laboratory demonstrations on liquid turbulence phenomena, including the thermodynamic aspects of liquid systems and material transport; University of Missouri, Rolla.

25. Effects of Radiation on Semiconductors: a five-day workshop for electrical engineers and others on the latest research information on radiation effects on various semiconductors; University of Missouri, Rolla.

26. Rock Mechanics Workshop: a five-day workshop for mining and construction engineers on the theory and application of rock mechanics; University of Missouri, Rolla.

MONTANA

1. Digital Computer Conference on Civil Engineering: a conference to familiarize practicing civil engineers with the operation and capabilities of digital computers and with computer operations; Montana State University, Bozeman.

2. Engineering Research and Development Report: publication of the Engineering Research and Development Report to point out to Montana's businessmen the potential industrial applications of the research; Montana State University, Bozeman.

3. Water and Waste Treatment Workshop: a workshop to acquaint operating and supervisory personnel of private treatment plants with the latest technology dealing with pollution control of water supplies; Montana State University, Bozeman.

4. Civil Engineering and Engineering Mechanics Seminar: a seminar, with internationally recognized leaders in their fields as speakers, to acquaint practicing engineers with the latest techniques and processes for solving problems in the traditional areas of structures, hydraulics, earthwork, foundations and transportation; Montana State University, Bozeman.

5. Chemical Processing Field Service: field services conducted by a team of three members of the Chemical Processes Laboratory to assist chemical processing companies in cutting manufacturing costs by using the latest technology, to look for opportunities to introduce new equipment and process control and to assist on latest processes and techniques available for combating air and water pollution; Montana State University, Bozeman.

6. Seminar on Drug Selection by Computer: a computer based drug information and classification system to present to pharmacists and related personnel the limitations and potential of drug selection by computer, review a feasible computer program which permits matching sample drugs to clinical requirements and participate in computer laboratory exercises relating to drug selection; University of Montana, Missoula.

7. Computer Technology Seminar: a one and one-half day seminar and demonstration to be presented in four Montana cities to acquaint businessmen with applications of computer technology and statistical decision making to industry problems, systems analysis and profit relationships and the feasibility of technological applications; University of Montana, Missoula.

8. Forest Thinning by Remote Ignition: a demonstration to forest managers and private land owners of the application of remote ignition techniques for thinning timber stands to increase the growth rate of the remaining trees; University of Montana, Missoula.

9. Forest Genetic and Silviculture Workshop: a workshop to provide forest land managers with an understanding of modern genetics and tree-improvement techniques and to emphasize the technical applications of genetics to plant breeding; University of Montana, Missoula.

10. Mining Field Visitation: regular visits to small mines by geological engineers to identify problems and convey information on new innovations in machinery, equipment and methods of mining; Montana College of Mineral Science and Technology, Butte.

11. Directory of Montana Scientists and Engineers: a continuing project to prepare and maintain a master file and publish a directory of scientific and technological expertise; Montana College of Mineral Science and Technology, Butte.

12. Administration of the Montana State Technical Services Program: administration by a qualified professional of the overall technical services program for the State of Montana; University of Montana, Missoula.

13. Workshop for Feed-Lot Operators: a workshop to provide ranchers, feed-lot operators and feeders with technology relating to feed storage and retrieval methods, capacities of feed-lots, weather protection facilities and marketing techniques; Eastern Montana College, Billings and University of Montana, Missoula.

NEBRASKA

1. Administration of Technical Services Program: performed by trained professionals responsible for the administrative activities involving coordination of public information from participating institutions and academic units, scheduling and coordinating group education activities, preparation of annual reports and other documents required by the program, and evaluating the effectiveness of projects; Nebraska Department of Economic Development, Lincoln, University of Nebraska, Lincoln, University of Omaha, Omaha.

2. Technical Information Service: a variety of informational services including indexing of stored data, user interest profiling, search and retrieval, expertise referrals, publication of a technical digest and professional services directory; University of Nebraska, Lincoln.

3. Metal Processing Seminar: a one-day seminar for managers, owners, operators and

engineering personnel from small metal fabrication plants on the current techniques of nondestructive testing including demonstrations on radiography, acoustic, electrical eddy current and penetrant methods; University of Nebraska, Lincoln.

4. Agricultural Machinery Manufacturers Conference: a two-day conference for managers and owners of small agricultural machinery plants to present the applications of numerical controlled machine tools in small lot production, including economic considerations and a demonstration and workshop with actual equipment and parts; University of Nebraska, Lincoln.

5. Industrial Engineering Seminar: a one-day seminar for engineers, production control and inventory control managers and personnel on practical techniques and advances in all phases of inventory and production control; University of Nebraska, Lincoln.

6. Integrated Circuits: a two-day short course for senior design engineers and managers on the fabrication techniques and applications of both linear and digital integrated circuits, including network analysis and modeling techniques; University of Nebraska, Lincoln.

7. Transportation Symposium: a two-day symposium for private consultants, engineers, construction managers and representatives of transportation and related industries on new developments and concepts in transportation, including economics, mobility and future modes and methods; University of Nebraska, Lincoln.

8. C.P.M. in the Construction Industry: a one year pilot demonstration and implementation of C.P.M. for planning, scheduling and control of construction projects in industry, including three two-day seminars, the preparation and publication of manuals and reports, and technical assistance services; University of Nebraska, Lincoln.

9. Field Service and Counseling Program: a direct field counseling service to provide contact with managerial and scientific personnel in industry, to define and pinpoint areas of scientific and technological information requirements, to disseminate the needed information, to assist in identifying specific problems and to provide referral to sources of expertise; University of Nebraska, Lincoln, University of Omaha, Omaha, Kearney State College, Kearney.

10. Materials Handling Seminar: a two-day seminar for managers and supervisors on the economic aspects of materials handling, equipment and applications, containerization concepts, and the systems approach to materials handling; University of Omaha; Omaha.

11. Welding Design and Reliability: a two-day short course for managers and engineers on new welding processes and their influence on weld design and reliability, includes cryogenic problems in welding, plasma welding, high-strength aluminum and stainless steel welding and non-destructive testing; University of Omaha, Omaha.

12. Industrial Application of the Computer: a one-day short course for top-level executives on the latest computer equipment and software programs including time sharing and remote hookups, design drawing with computers and future prospects; University of Omaha, Omaha.

NEVADA

1. Administration: administration by a qualified professional of both the continuing education and information services portions of the program, including publication of a monthly newsletter; University of Nevada, Reno.

2. Publications: publication by the Bureau of Business and Economic Research in the College of Business Administration of a monthly newsletter entitled, "The Nevada Business Review", to announce technical service activities to businessmen; University of Nevada, Reno.

3. Field Service: field services conducted by a team of representatives from both the College of Engineering and the Bureau of Mines to make technology available to businessmen and the mining industry; University of Nevada, Reno.

4. Public Relations: a project to provide better publicity and timing for educational projects as an aid to improving attendance, to publicize the services available to business and industry under State Technical Service, and to enhance the professional image of the State Technical Services program; University of Nevada, Reno.

5. Dynamics of Suspension and Steering: a short course to improve the engineering skills of practicing engineers and supervisory mechanics in structural dynamics by using an automobile suspension system as a known training device; University of Nevada, Reno.

6. Electronic Technology: a short course to present technical concepts of electronic

components and circuits, design and testing of voltage and power amplifiers, transitor amplifiers and computer circuits to practicing engineers and technicians; University of Nevada, Reno.

7. Critical Path Methods: a short course to acquaint contractors, engineers and supervisors with critical path methods of planning and scheduling a project; University of Nevada, Reno.

8. Hydraulic Power and Control: a short course for supervisory mechanics, technicians and engineers on fluid flow and control of fluid flow, control principles and systems, and causes of hydraulic and mechanical malfunctions; University of Nevada, Reno.

9. Advanced Welding: a series of four one-day workshops for self-employed, supervisory, or leading welders to introduce modern techniques in the use of alternating current electric and gas welding equipment; University of Nevada, Reno.

10. Basic Industrial Statistics: a series of fifteen one-hour lectures to acquaint both management and technical personnel with the definition, measurement, and estimation of probability statistical measurement and evaluation techniques and to demonstrate the statistical design of experiments; University of Nevada, Reno.

NEW HAMPSHIRE

1. Technical Field Service: provide field liaison between participating institutions and all segments of business, commerce and industry; and between potential users of current scientific and technical information and the State Technical Service technical information service; University of New Hampshire, Durham.

2. Technical Information Service: provide technical information and referral services to the electronics industry of New Hampshire, and provide current information on new product technology to all New Hampshire industries; University of New Hampshire, Durham.

3. Civil Engineering Computer System: provide practicing engineers, surveyors, architects, and contractors in the State of New Hampshire with a readily accessible, practical, civil engineering-oriented computer system; University of New Hampshire, Durham.

4. Computer Technology Workshop: workshops in high-speed computer technology for management of small and medium sized firms; University of New Hampshire, Durham.

5. PERT-CPM and Zero Defects Technology Courses: course in PERT and CPM to qualify management personnel to use network analysis systems in planning and scheduling projects and to apply zero defects concepts: University of New Hampshire, Durham.

6. Materials Testing Technology Course: a six-week, one-day a week, evening course on materials testing and use of instruments for technical personnel in New Hampshire industry; University of New Hampshire, Durham.

7. Ski Industry Technology: promote wider use of utilization of current technology in the development of recreation (ski) resources, including lift devices and snow engineering; University of New Hampshire, Durham.

8. Computer Time-Sharing Technology: demonstrations and workshops for managers on use of time-shared computer by small firms and businesses; Dartmouth College, Hanover.

9. New England Regional Program: New Hampshire portion of administration and implementation of a regional technical services program for the six New England States; New England Center for Continuing Education, Durham.

10. Administration: planning and coordination of the overall technical services program for the State of New Hampshire; Office of the Governor, Concord.

NEW MEXICO

1. Program Administration: a professional staff plans, coordinates, and controls all technical services, field work and information dissemination, directs public information activities, and develops and implements seminars, conferences and workshops through the various participating institutions; University of New Mexico, Albuquerque.

2. Retrieval, Processing and Selective Dissemination of Technical Information: makes available to industry, through the Technology Application Center (TAC), new knowledge and techniques developed by research through a systematic program of providing access to literature, techniques, processes, and procedures which are applicable to technologically based problems; University of New Mexico, Albuquerque.

3. Field Services: Field services: field services to industrial firms and other selective businesses to identify areas of opportunity for the expansion of economic activity through the use of technology, conducted by one full-time and one half-time field services engineer; University of New Mexico, Albuquerque.

4. Building Technology for Architects and Constructors: a three-day conference to introduce the latest developments in building technology to architects and builders and to reduce the lag in the adoption of new technology by the building industry; University of New Mexico, Albuquerque.

5. Shared-Time Computer Systems: a one-day conference to present the potential usefulness of the shared-time concept in using computers to management scientists, engineers, computer specialists, business owners and management personnel; University of New Mexico, Albuquerque.

6. Management of Engineers and Scientists: a two-day seminar to present the latest developments in scientific devices and techniques to enable scientists, engineers and managers of technical organizations to render decisions to more effectively utilize technical information; University of New Mexico, Albuquerque.

7. Geological Conference: a three-day field conference to enable geologists and business managers to explore the varied and complex geologic environments of the State and to evaluate geologic problems in proper context to the socio-economic setting, assisted by the publication of a guidebook containing the geologically-oriented road logs and technical papers dealing with the specific areas visited; University of New Mexico, Albuquerque.

8. Consultant Directory and Referral Service: preparation and maintenance on a current basis of a directory of scientific and engineering expertise together with a current referral service; New Mexico State University, University Park.

9. Capital Expenditure Analysis for Engineering Decision-Making: a two-day seminar to introduce engineers and other technical personnel to the methods of evaluating proposed capital expenditures in their firms through various analyses, formulas, factors, monographs and engineering determinations; New Mexico State University, University Park.

10. Critical Path Method of Maintenance Scheduling: a two-day workshop to introduce engineers and technical personnel directly responsible for the planning and scheduling of maintenance and construction of refineries and mining installations to the use of critical path method scheduling and cost control techniques; New Mexico State University, University Park.

11. Industrial Engineering for the Smaller Firm: two one and one-half day seminars for engineering and general management personnel to promote more widespread use of those industrial engineering techniques that are likely to improve the level of technology and the profitability of smaller firms; New Mexico State University, University Park.

12. System Engineering: a two-day workshop to acquaint owners, managers and engineers of smaller technical firms with the state-of-the-art in systems engineering; New Mexico State University, University Park.

13. Problem Oriented Computer Languages for the Chemical Industry: a two-day seminar to introduce to industrial production, design, and research personnel the most recent problem-oriented digital computer languages; New Mexico State University, University Park.

14. Conference on Hydrologic Techniques: a two-day conference for geologists and drillers to review new developments in hydrologic technology, such as modern exploration methods, construction techniques, testing methods, new equipment, and sources of basic information, and to publish and distribute the proceedings; New Mexico Institute of Mining and Technology, Socorro.

15. Conference on Raw Material Sources for Structural Clay Products: a two-day conference to prepare and distribute an extensive technical report to geologists and potential producers of structural clay products to reveal firing characteristics and suitability of the available resources for commercial exploitation; New Mexico Institute of Mining and Technology, Socorro.

NEW YORK

1. Technical Information Data Bank: computer-based bank of updated information spanning a broad spectrum of science and technology; State University of New York, Buffalo.

2. Selective Information Dissemination Service: computer-based system to match information needs of businesses with information stored in the data bank and distribute this

selected information; State University of New York, Buffalo.

3. Reference and Referral Service: service to guide industrial and commercial clients to available sources of technical information and to perform literature searches; State University of New York, Buffalo.

4. Field Services: maintain liaison with scientists and engineers in industry to determine their information needs and to provide guidance in meeting these needs; State University of New York, Buffalo.

5. Nuclear Science and Technology Dissemination Service: produce an awareness of industrial applications of nuclear science and technology through newsletters, maintaining technical profiles of potentially interested industries and supplying industry with information through a current awareness service; Western New York Nuclear Research Center, Buffalo.

6. Nuclear Science and Technology Referral Service: provide directories of qualified consultants and information centers for referral services; Western New York Nuclear Research Center, Buffalo.

7. Nuclear Science and Technology Workshop and Training Programs: provide a workshop on "Safe Handling and Uses of Radioisotopes" and other educational services; New York Nuclear Research Center, Buffalo.

8. Technical Information Center: information center to provide bibliographic, reference and referral, and translation service in the Genessee Valley region; University of Rochester, Rochester.

9. Graphic Arts Progress Information Service: expand publication on graphic arts progress and provide information service; Rochester Institute of Technology, Rochester.

10. Field Services: provide close constant contact with small industries in outlying areas to ascertain and assist in solving technical problems of industry; Cornell University, Ithaca.

11. Technical Information Dissemination: to call the attention of over 1200 technical industrial concerns to significant and pertinent technological and scientific developments through abstracts, research papers, bibliographies, and indexes; Cornell University, Ithaca.

12. Short Courses, Workshops and Seminars: two-week courses on topics related to pertinent advances in technology of interest to industry in Southern Tier Area of New York; Cornell University, Ithaca.

13. Technical Referral Service: establish and operate a referral service to guide industrial users to sources of information or to qualified consultants; Cornell University, Ithaca.

14. Food Processing Information Center: retrieval and dissemination of food processing information through newsletters, bulletins and special communications; Cornell University, Ithaca.

15. Technical Referral Services for Food Processing Industry: provide food processing industry with lists of pertinent laboratories, consultants, products and equipment; Cornell University, Ithaca.

16. Technical Workshops and Seminars in Food Processing: to up-date food processing industry in latest processes and techniques and in plant pollution control; Cornell University, Ithaca.

17. Technical Information Services: information service for Central New York, including interest profiling and inventories of technical resources and materials available; Syracuse University Research Corporation, Syracuse.

18. Technical Referral and Reference Services: reference to sources of expert help or information on the technological problems of business; Syracuse University Research Corporation, Syracuse.

19. Technical Workshops and Seminars for Central New York: six seminars and conferences on metals processing industries, electronic and computer applications, pollution (air-water) control, and machinery and controls; Syracuse University Research Corporation, Syracuse.

20. Forest Industries Field Service: contact industry to identify their interests and to locate problems and sources of assistance; Syracuse University, Syracuse.

21. Wood Industries Abstracting and Indexing Service: locate and abstract applicable research findings and technological information on the wood industries; Syracuse University, Syracuse.

22. Wood Industries Information Dissemination Service: interpret new information in wood industries and distribute periodic leaflet series; Syracuse University, Syracuse.

23. Referral Service for the Forest Industry: service to recommend sources of expert help

to forest industry firms with technical problems; Syracuse University, Syracuse.

24. Workshops and Short Courses for Forest Industries: two short courses in new uses for industry residue and foreign woods; Syracuse University, Syracuse.

25. Technical Workshops and Seminars: present short workshops and seminars in areas such as computer methods for design of complex structures, application of plastics to product design, cryogenics, and chemical analytical methods; Rensselaer Polytechnic Institute, Troy.

26. Technical Resources Service: develop and operate a technical information service for the Long Island area; SUNY at Stony Brook, Long Island.

27. Field Extension Service: ascertain problems of local firms, and aid them identify channels through which answers can be obtained, SUNY at Stony Brook, Long Island.

28. Conferences and Workshops for Industry: develop and present conferences and workshops on electronics, aero-space industries, marine industries, oceanographic engineering, and computer applications; SUNY at Stony Brook, Long Island.

29. Industrial Development and Waste Management Technical Assistance: assist in introducing and improving utilization of scientific and technological methods for problems of industrial and waste management and problems of transportation; SUNY at Stony Brook, Long Island.

30. Technical Field Service: contact firms to ascertain assistance required, evaluate effectiveness of program and determine workshops, courses and seminars needed; New York University, New York.

31. Technical Referral Service: develop lists of consultants and work with existing technical "data banks" to provide referral service for New York City area; New York University, New York.

32. Technical Workshops and Seminars: present workshops and seminars in the areas of graphic arts, ocean engineering, urban transportation, plastics, noble metallurgy, and nuclear power; New York University, New York.

33. Technical Information Services on Water Pollution: provide a technical information and referral service in the field of water pollution in the Metropolitan New York area and surrounding counties; Manhattan College, New York.

34. Air Pollution Control Information for Industry; Technical Referral: provide air pollution control and system design industry information on the latest scientific and technical knowledge in the field; Cooper Union, New York.

35. Air Pollution Control Information for Industry; Workshops and Seminars: present industry and commerce with economics and means of abatement of air pollution; Cooper Union, New York.

36. Technical Services in Geology: assist commerce and industry through disseminating information relating to geological science and applicable in current practices; St. Lawrence University, Canton, New York.

37. Technical Referral Service: develop an inventory of expertise of pertinance to industry in the region and make referrals; SUNY at Binghamton, Binghamton.

38. Technical Information and Referral Service: field and information service to identify local needs for technical information and distribute information through State Technical Services bulletin; SUNY at Binghamton, Binghamton.

39. Seminars on Technical Subjects: develop and present seminars on chemistry developments applicable to local industry, SUNY at Binghamton.

40. Computer-Aided Design and Analysis Short Courses: orient practicing civil engineers and architects to modern computer aided methods of operations, design and analysis; City University of New York, New York.

41. Technical Information and Referral Service: provide technical information service for local industries, businesses and commercial establishments; Clarkson College of Technology, Potsdam.

42. Computer Advisory Seminars for Small Business: three one-day seminars to orient small businesses to the use of computers; Clarkson College of Technology, Potsdam.

43. Administration: Administration, planning, and coordination of the overall technical services program for the State of New York, New York Dept. of Commerce, Albany.

NORTH CAROLINA

1. Technical Information Center: designed to serve scientists, engineers, managers and other technical personnel in over 8,500 North Carolina firms by providing reference, referral, literature searching, photocopy and loan services supplemented by personal contact with industry to assure effective development of future service; North Carolina State University, Raleigh.

2. Field Liaison Program: field offices are being developed in four regions of the State to provide personal visitations to industrial firms to identify problems, and to make these firms aware of the technical services available in the State; North Carolina State University, Raleigh.

3. Training Aids for Loan Service: a film library containing topics on methods improvement, quality control, industrial engineering applications, numerical controls, electronic data processing and other technologies to update the industrial base of the State; North Carolina State University, Raleigh.

4. Technical Information Center: provides industry capability to search NASA collection of scientific technical literature and the current chemical literature of the world indexed by Chemical Abstracts Service; Research Triangle Institute, Durham.

5. Conference on New Business Technology: a series to be conducted one day a week for ten weeks designed to enable executive managers to acquire skills in utilizing statistics, mathematics and the computer in corporate management; East Carolina University, Greenville.

6. Administration: Administration, planning and coordination of the overall technical services program for the State of North Carolina; North Carolina State University, Raleigh.

OHIO

1. Technical and Business Services Program Administration: performed by a qualified professional with overall responsibility for implementing and coordinating state-wide activities; Ohio Board of Regents, Columbus.

2. Technical and Business Services Newsletter: a monthly publication containing reports, abstracts, catalogs, educational progress and new products and processes of interest to business and industry; Ohio Department of Development, Columbus.

3. Technical and Business Services Information Brochure: to describe and summarize the entire State Technical Services program for distribution to scientists, engineers, researchers, businessmen and trade and professional associations; Ohio Department of Development, Columbus.

4. Referral Service Network: system of eight regional offices providing referral to current sources of scientific and technical information, scientific expertise, in-plant identification of problems and access to other sources of information.

   Region 1, Kent State University, Kent.
   Region 2, Cleveland State University, Cleveland.
   Region 3, University of Akron, Akron.
   Region 4, University of Toledo, Toledo.
   Region 5, Ohio State University, Columbus.
   Region 6, Wright State University, Dayton.
   Region 7, Miami University, Oxford.
   Region 8, Ohio University, Athens.

5. Machine Tool-Manufacturing Technical Information Center: to provide technical information dissemination, a quarterly journal, in-plant technical services, and seminars and lectures on methods, procedures, developments and related technology to high-level engineering and technical personnel; University of Cincinnati, Cincinnati.

6. Silicate Technical Information Center: to provide a bulletin containing abstracts, references, techniques, process developments, manufacturing and construction applications, translations of foreign literature and reprints; University of Toledo, Toledo.

7. Continuing Education Courses: a total of 14 individual short courses, seminars and conferences designed especially for the needs of Ohio industry on the following topics:

   Recast Concrete Methods and Connections; Cleveland State University.
   Ultimate Strength and Limit Design in Concrete; Cleveland State University.
   Instrumentation Seminar; Kent State University.
   Offset Lithography Seminar; Kent State University.
   Building Design and the Ohio Building Code; Ohio State University.
   Fire Safety Design in Buildings; Ohio State University.
   Laser Beam Technology; Ohio University.
   Numerical Control Workshop; Miami University.
   Offset Duplication; Miami University.

Space Technology Applications; Miami University.
Design Methodology; University of Cincinnati.
Machine Tool Seminar; University of Cincinnati.
Materials Technology; University of Dayton.
Scientific and Engineering Management Development Program; Wittenberg University.

OKLAHOMA

1. Data Processing for Small Business Management: two courses, each extending over a four month period, designed to acquaint business managers in Logan County with an introduction to business data processing and the use of specialized electronic accounting machines; Langston University, Langston.

2. Management Science and Systems Management: a short course of ten two-hour sessions held once per week to enable managers to make effective use of new management technologies including operations research techniques such as PERT and linear programming and systems concepts as applied to the management of a complex business organization; Oklahoma City University, Oklahoma City.

3. The Engineering of Technical and Human Factors: a short course of ten two-hour sessions, one each week, for supervisors covering topics on new technological advances in such areas as production planning and control, work simplification, time and motion studies, quality control, inventory control and work flow; Oklahoma City University, Oklahoma City.

4. Quantitative Approaches to Management Science: a short course of ten two-hour sessions, one each week for supervisors on the use of quantitative techniques to problems concerned with optimum inventories, scale of production, composition of output, strategies in the face of uncertainty and queuing problems covering such topics as linear programming, inventory models, Markov chains and game theory; Oklahoma City University, Oklahoma City.

5. Value Engineering and Cost Reduction: twenty hours of instruction consisting of ten two-hour sessions for owners, managers and key employees of commercial and industrial enterprises interested in a systematic review, analysis and evaluation of cost reduction techniques encompassing topics concerned with innovation, time and motion study, process analysis, plant layout and value engineering; Oklahoma City University, Oklahoma City.

6. Purchasing and Materials Management: a short course of ten two-hour sessions for personnel engaged in purchasing, materials management, design engineering and procurement specifications covering subject material on PERT, CPM, waiting-line analysis and the effects and utilization of computer systems; Oklahoma City University, Oklahoma City.

7. The Engineering of Management Systems: a short course of ten two-hour sessions for supervisors covering new technological advances in the design and analysis of management information systems with emphasis upon the use of electronic computers; Oklahoma City University, Oklahoma City.

8. Accoustics and Noise Control in Buildings: a three-day workshop and the preparation of a reference manual for architects, engineers and builders covering acoustic interior design; Oklahoma State University, Stillwater.

9. Advanced CPM/PERT Conference: three conference days for engineers, scientists and managers covering subject matter on CPM under conditions of certainty and uncertainty, allocation of scarce resources and resource leveling with emphasis upon the use of computers to solve problems of concern to management; Oklahoma State University, Stillwater.

10. Design and Administration of Preventive Maintenance Systems: a three-day short course for managers and engineers on the application of engineering technology to the design, implementation and administration of a preventive maintenance program; Oklahoma State University, Stillwater.

11. Methods Improvement Conference: a three-day short course for engineers, supervisors and staff personnel consisting of topics on flow process charting, man-machine systems analysis, design of human work activities, methods of time measurement and work sampling using statistical procedures; Oklahoma State University, Stillwater.

12. Analysis and Design of Paperwork Systems: a three-day conference for supervisory and staff personnel covering topics on flow process charting, form process charting and other systems analysis procedures; Oklahoma State University, Stillwater.

13. Operations Research Conference: a three-day conference for technically oriented personnel in management positions to enable them to apply newer theories of optimization of decisions related to business and industrial

activities and covering topics in probability theory, Monte Carlo simulation, Markov processes, PERT/CPM, procurement and inventory models, linear programming, queuing and sensitivity analysis; Oklahoma State University, Still water.

14. Water Supply and Pollution Control: a five-day short course for industrial and municipal supervisory personnel on new developments in the technology of water supply and waste water treatment that will enable operators to handle industrial wastes in a more efficient manner as well as to provide more and better water to large and small industries of the State; Oklahoma State University, Stillwater.

15. Industrial Wastes Conference: four half-day sessions for supervisors of waste and water treatment facilities at industrial plants with conference topics including discussion of unit processes such as ion exchange, distillation, adsorption, etc. which can be used following secondary treatment of industrial effluents with sufficient information presented to permit evaluation of specific techniques to guide the design and operation of a pilot plant or full scale plant; Oklahoma State University, Stillwater.

16. Engineering Geology and Rock Mechanics: a three-day conference for civil, construction, consulting and geological engineers to bring about an awareness of all relevant knowledge in rock mechanics and geology on the building of roads, dams, tunnels, and foundations; Oklahoma State University; Stillwater.

17. Technical Services Field Agent Project: a field liaison activity designed, through personal contact with businessmen of the State, to isolate and identify key problems and to make such referrals of information sources or expertise so as to effect a solution to these technologically based problems; Oklahoma State University, Stillwater.

18. Integrated Civil Engineering Systems Course for Engineers: a five-day short course for civil engineers to acquaint them with some of the new computer programs that can be used to solve civil engineering design problems and covering programs such as COGO, POGO, STRESS, STRUDL, BRIDGE, SEPOL and TRANSIT; University of Oklahoma, Norman.

19. Technical Services Field Agent Project: a field liaison activity oriented toward serving the businessmen in Southern Oklahoma by providing releases of pertinent technical information to specific businesses and industries, the provision of information library services in response to requests and a limited personal contact activity to identify industrial problems; Southeastern State College, Durant.

20. Technology Utilization Seminars: two seminars for the small and medium businesses to increase awareness and sustain interest in the transfer of new technology from its origin to the industrial community with material selected to create interest rather than the solution of specific problems; Southeastern State College, Durant.

21. Technological Seminars for Small Industrial Management: fifteen two-hour sessions designed to make owners and managers of established and emerging industrial concerns of Western Oklahoma aware of technical information on the utilization of computers and data processing equipment to adequately control inventory and costing systems; Southwestern State College, Weatherford.

22. Pharmaceutical Seminars for Druggists and Pharmacists: sixteen three-hour sessions for pharmacists and druggists throughout the State covering topics on drug control, pharmaceutical practices, pharmacologic action of therapeutic groups and modern dispensing techniques; Southwestern State College, Weatherford.

23. Chemical Quality Control for Processing and Packaging Firms: eight four-hour workshops in central locations in Oklahoma designed to update quality control supervisors and managers of processing and packaging firms in the latest instrumentation techniques of quality control and the demonstration of how the new technology can be adapted to various production processes; Southwestern State College, Weatherford.

24. Field Service Technical Information Program: an activity providing library documents and facilities to supplement the Oklahoma State University field liaison program and to provide limited problem identification and referral service to the countries in Southwestern and Western Oklahoma; Southwestern State College, Weatherford.

25. Administration: administration and coordination of the technical services program for the State of Oklahoma; Oklahoma State University, Stillwater.

OREGON

1. Administration of State Technical Services Program: performed by a professionally

qualified staff with overall responsibility for implementing and coordinating state-wide activities; Economic Development Division, Portland.

2. Reed Information Center for Nuclear Science: a technical library to make available to academic, industrial and business organizations information on nuclear developments and applications, including the AEC Nuclear Science Abstracts; Reed College, Portland.

3. Nuclear Reactor Lectures: a two-part series to describe and demonstrate the uses and applications of nuclear reactors to business leaders, engineers, scientists, and industrial representatives; Reed College, Portland.

4. Industrial Inventory of Technical Data Requirements: a compilation of Oregon manufacturing firms by specific categories of technical information interests; Economic Development Division, Portland.

5. Oregon Technical Field Services: initially to familiarize business and industry with the sources of technical assistance including information and referral services and services provided by the State; Economic Development Division, Portland.

6. Oregon Technical Information Exchange: a referral service utilizing a central memory system containing information on scientific and technical personnel and organizations; Oregon Museum of Science and Industry, Portland.

7. Technical Services to the Fishing Industry: a coordinated program of field visits, workshops, seminars, demonstrations and newsletter to assist the fishing industry in the application of technical information; Oregon State University, Corvallis.

8. Technical Services by the Food Processing Extension Center: a comprehensive educational program including information dissemination and short courses on the potentials of various new dehydration and other food processing techniques for food processing and grower groups; Oregon State University, Corvallis.

9. Technical Services to the Forest Industries: a coordinated program of field visits, extension services, seminars, and dissemination of technological information to forest product firms and secondary manufacturing industries; Oregon State University, Corvallis.

10. Information Dissemination Service of Scientific Data Related to Commercial Nuclear Installations: an information series to acquaint the general public with the scientific facts of proposed and existing commercial nuclear installations, with particular emphasis on the environmental effects of waste heat, radiation hazards and public benefits, through the media of publications, seminars and speakers; Department of Commerce, Economic Development Division, Portland.

PENNSYLVANIA

1. PENNTAP Information Center: disseminate useful knowledge obtained from the technical literature, concentrating on fabricated metal and metal plating and coating; Franklin Institute of Technology, Philadelphia.

2. Library Information System: process requests from industry and supply literature to answer technical questions from seven areas in the Commonwealth; Pennsylvania State University, University Park.

3. New Technology in the Materials Field: traveling one-day seminars and one and two week intensive courses on various aspects of materials technology for industrial scientists and engineers; Pennsylvania State University, University Park.

4. Carbon and Graphite Literature Dissemination: prepare and disseminate to industry a computer data file on carbon and graphite literature; Pennsylvania State University, University Park.

5. Information Switching Program: disseminate technical and scientific information from both published and report literature, with emphasis on information relating to materials, and their properties and processes; University of Pittsburgh, Pittsburgh.

6. Mobile Library Program: through a "researchmobile" inform business, industry and research organizations of available scientific and technical information and the means by which it can be quickly located and obtained for use; Carnegie Library of Pittsburgh, Pittsburgh.

7. Color Measurement Seminars: present the latest technological advances in industrial color matching in three-day seminars; Philadelphia College of Textiles, Philadelphia.

8. Textiles in the Engineering Sciences: four seminars on (1) the structure and properties of textile materials, (2) engineering of textile materials, (3) handling of textile materials,

and (4) new textile fibers; Philadelphia College of Textiles, Philadelphia.

9. Computer Simulation Techniques: eight three-hour lectures and four three-hour workshops on application of computer simulation techniques to solve production control and inventory problems of small manufacturers; Duquesne University, Pittsburgh.

10. PENNTAP Radio Programs and Audio Library: weekly service to radio stations in the Commonwealth of five four and one-half minute programs on application of research information to industry; Pennsylvania State University, University Park.

11. Meteorological Information System: provide experimental meteorological information service to fuel oil distributors and construction contractors in northeastern and central Pennsylvania to effect reduced operating costs; Pennsylvania State University, University Park.

12. Administration: Administration, planning and coordination of the overall technical service program for the Commonwealth of Pennsylvania; Pennsylvania State University, University Park.

PUERTO RICO

1. Technical Approach to Industrial Maintenance Management: a three-day weekend seminar for executives from industry designed to convey new approaches to maintenance including inventory control, cost control systems, applications of work sampling and how CPM can benefit maintenance operations; Commonwealth Economic Development Administration, San Juan.

2. Productivity and Work Measurement: a weekend seminar for factory managers to update their knowledge on increasing productivity through work measurement including topics on operations analysis, flow diagrams, principles of motion economy, process charts, statistical applications and work sampling; Commonwealth Economic Development Administration, San Juan.

3. Industrial Management: four extension courses each twice a week for two and one-half months designed to bring the scientific management approach to the administration of factories and covering topics on quality control, plant layout, methods analysis, techniques of material handling, production control, inventory control and cost controls; Commonwealth Economic Development Administration, San Juan.

4. Structural Analysis by Computer Method: a four-day course for structural engineers to update their knowledge to the theories of analysis necessary for utilization of computer facilities so as to meet the increasing demands on the profession and to retard the obsolescence of the presently existing force of professional structural engineers; American Society of Civil Engineering, San Juan.

5. Research Management: a three-day seminar to upgrade the management skills of research supervisory personnel concentrating upon the problems and solutions in the management of research and development; Commonwealth Economic Development Administration, San Juan.

6. Technical Industrial Advisors: a field liaison activity that serves general business, commerce, and industry with situation analyses performed in response to requests and provides in-depth analysis of technical and managerial problems, specific solutions, better technologies, material or machinery to effect cost reduction; Commonwealth Economic Development Administration, San Juan.

7. Technical Information Center: a facility using existing library and clearing house resources available to serve the scientific and technological needs of the Commonwealth's business, commerce and industry; University of Puerto Rico, Mayaguez.

8. Electronic Devices for the Fishing Industry: a demonstration project to demonstrate to the industry the feasibility of using modern electronic devices to locate schools of fish; Commonwealth Department of Commerce, San Juan.

9. Special Technical Projects: a series of three related activities that provide all types of local manufacturers the opportunity to upgrade their scientific and technological know-how through: 1) reference to a technical directory of scientific and engineering resources of the Commonwealth; 2) translation of technical articles for better dissemination of technical information among non-bilingual industrialists; and 3) the preparation of productivity reports, state of the art reviews, and other technical reports for industrial groups which will be brought to the attention of local manufacturers; Commonwealth Economic Development Administration, San Juan.

10. Administration: Administration, planning and coordination of the overall technical services program for Puerto Rico; Commonwealth Economic Development Administration, San Juan.

RHODE ISLAND

1. Field Service for the Fishing Industry: dissemination of the latest technology and scientific methods to Rhode Island's fishing industry as well as to others in need for marine resource technology information; University of Rhode Island, Kingston.
2. Pharmacy Clinic: a two-day annual technological refresher course for pharmacists in Rhode Island, includes technological information on new drugs, current trends in therapy, new legislation and new methods for preparing pharmaceuticals; University of Rhode Island, Kingston.
3. Computer Technology for Small and Middle-Sized Firms: two three-day seminars on computer fundamentals, management science and systems, and management of computer technology; University of Rhode Island, Kingston.
4. Textile Technology and Merchandising: two one-day seminars on recent textile technology developments, including fibers, fabrics, and finishing technology for middle management in retail firms; University of Rhode Island, Kingston.
5. Food Services Technical Education Center: provide counselling services, training courses, and dissemination of modern technological knowledge on food to managerial personnel of food service establishments.
6. Technical Services Advisory Center: to provide a field service to incorporate new technology in Rhode Island industry through visits, problem identification, and information transfer; University of Rhode Island, Kingston.
7. Industrial Precious Metals Electroplating Conference: a conference to inform the industrial precious metals electroplating industry of recent technological developments, for management personnel of industry and others from allied fields; University of Rhode Island, Kingston.
8. Annual Pharmacy Clinic: expand this annual clinic to present current technological information to practicing pharmacists; University of Rhode Island, Kingston.
9. Annual Antipollution Conference: three-day conference to focus on general and specific anti-pollution needs of Rhode Island and to present techniques and equipment to improve operations and treatment; University of Rhode Island, Kingston.
10. New Technology and Development Dissemination: communicate to practicing engineers through a weekly journal, Engineering, features describing new developments in fields of engineering; Providence Engineering Society, Providence.
11. Engineering Conference: promote the interchange of ideas and concepts pertaining to new technology among professional engineers by two conferences sponsored by the Providence Engineering Society and affiliated and associated organizations; Providence Engineering Society, Providence.
12. New England Regional Program: Rhode Island portion of administration and implementation of a regional technical services program for the six New England States; New England Center for Continuing Education, Durham, New Hampshire.
13. Administration: Administration, planning, and coordination of the overall technical services program for the State of Rhode Island; University of Rhode Island, Kingston.

SOUTH CAROLINA

1. Field Service Assistance in Management and Production Problems: a field liaison service to identify industry problem areas, suggest solutions or provide referrals to expertise or information sources for solutions; State Development Board, Columbia.
2. Coordinating Office for Sponsoring Workshops, Seminars and Conferences: an activity designed to determine scientific and technological needs of industry and plan projects to serve these needs; State Development Board, Columbia.
3. Technical Expertise Directory and Referral Service: a compilation of scientific and engineering manpower, research and development capabilities, and manufacturing facilities to be used to provide a reference service to the business and industry of the State; State Development Board, Columbia.
4. Technical Information Referral Service: a referral service for the diversified needs of the State's business, commerce and industry that will identify sources of technical information in State and private library facilities; State Development Board, Columbia.
5. Color Measurement Clinic: includes field service, seminars and workshop activities designed to serve all industry using color as part of its product by covering topics on instrumented

color matching, color control, and color sorting; Clemson University, Clemson.

6. Foundation Design: the development of a manual and seminars to serve architects and engineers on the design of spread footings, mat foundations, piers, pile foundations and other aspects of soil mechanics and foundation engineering; University of South Carolina, Columbia.

7. Administration: administration, planning, and coordination of the technical services program for the State of South Carolina; State Development Board, Columbia.

SOUTH DAKOTA

1. Administration of the State Technical Services Program: performed by a qualified professional on a part time basis with responsibility for coordination of state-wide program; State Planning Agency, Pierre.

2. Engineering Field Service: continued development of an inventory of technical capabilities, information requirements and problem identification for referral service, field visits to industrial concerns on problem identification and service requirements and coordination of the Engineering Experiment Station Services to business and industry; South Dakota State University, Brookings.

3. South Dakota Inventions - 1968: a technical description of significant inventions displayed at the South Dakota Inventor's Congress with diagrams and explanations of the products and their purpose and an evaluation and report of marketing potentials; University of South Dakota, Vermillion.

4. Technical Information Services: a combined information service program to supply and interpret technical information in answer to requests for assistance, to provide referral services as necessary for in-depth treatment of technical problems; and to visit business and industrial firms to assist in the identification and resolution of technical problems; South Dakota School of Mines and Technology, Rapid City.

TENNESSEE

1. Application of Instrumentation Technology to Design and Control of Industrial Processes: a sixty-hour course of lectures and laboratory work for graduate engineers employed in industrial positions involving responsibility for process or product control and measurement covering such topics as standards, static calibration, dynamic system response, transducer and systems theory; Tennessee Technological University, Cookeville.

2. Industrial Fluid Mechanics Course: a course of sixty hours of formal instruction and laboratory work given over a fifteen-week period for graduate engineers to update them on recent technological advances on such topics and fluid properties and flow parameters, fluid pressure and measurement devices, viscous effects and dimensional analysis and similitude for applications in turbomachinery, flow measurement, flow in closed conduits, open channel flow and hydraulic and pneumatic systems; Tennessee Technological University, Cookeville.

3. Portland Cement Concrete Technology: a forty-eight-hour lecture and laboratory course to be presented over a twelve week period structured to meet the needs of concrete design engineers and supervisory personnel with emphasis upon the technology of certain critical characteristics of concrete design and processing as related to the quality and strength of the finished product; Tennessee Technological University, Cookeville.

4. Fundamentals of X-Ray Diffraction Stress Analysis: a three-day seminar designed to transfer the most current knowledge about a highly sophisticated technique to practicing engineers, designers and scientists with primary emphasis upon x-ray diffraction stress analysis; Vanderbilt University, Nashville.

5. Material Handling Seminar: a one-day seminar for engineers and supervisory personnel charged with responsibility for the exercise of technical or managerial judgment about the flow of material through industrial or commercial processes covering automated and mechanized material handling systems; East Tennessee State University, Johnson City.

6. PERT/CPM Short Course: a six two-hour session short course designed for managerial and technical supervisory personnel who are responsible for planning and controlling the performance of relatively complex activities of a project nature through the introduction to program evaluation review technique and the critical path method; East Tessessee State University, Johnson City.

7. Work Simplification: a course consisting of eight sessions of two-hours duration given over an eight-week period designed for managers in decision making positions and

covering topics on process charting, work distribution and sampling, and principles of motion improvement to better prepare the participants for some of the more complex and sophisticated decisions which they may be called upon to make with regard to the more extensive use of mechanization, automatic control systems and improved quality assurance programs; East Tennessee State University, Johnson City.

8. Inventory Control: two courses, each of eight two hour sessions to be conducted over an eight week period for management personnel covering the importance of good inventory control, how it might be acquired and maintained; East Tennessee State University, Johnson City.

9. Polymer Technology: a one-day seminar designed to update chemists, chemical engineers, chemical process supervisors and product design engineers on the chemistry of polymers which are widely used in the production of plastics, resins, molding powders and fibers as well as manufacturing methods and equipment used in the production of polymers and the factors that affect polymer properties; East Tennessee State University, Johnson City.

10. Textile Terminology and Practices: a one-day seminar for textile scientists, engineers and sales service engineers covering such technical and scientific topics as textile chemistry, measurements and quality control, fabric and yarn technology and static and flamability problems; East Tennessee State University, Johnson City.

11. Chemical Process Control by Digital Computer: a one-day seminar for top management, manufacturing engineers, quality assurance engineers and industrial personnel responsible for procurement, programming and use of inplant control equipment and computers with emphasis upon techniques which may be used by firms performing manufacturing processes of a chemical nature to optimize their process control through the use of a single digital computer; East Tennessee State University, Johnson City.

12. Value Analysis: a short course of sixteen two-hour sessions for management, product designers, production supervisors and quality control personnel designed to provide the participants with value engineering concepts that will enable their firms to reduce costs while maintaining acceptable standards of performance; East Tennessee State University, Johnson City.

13. Operations Research: a one-day seminar directed toward the upper levels of management of complex organizations to enable them to review and understand the practical use of operations research techniques in solving industrial problems and including topics on concepts and methodology of operations research, computers and their implications for management information systems, statistical measures and probability, and typical problems amenable to application of the operations research approach; East Tennessee State University, Johnson City.

14. Solid State Electronics: three courses of from ten to twelve sessions each designed to upgrade scientistis and engineers on solid state circuits, receiver circuits and digital computer design; East Tennesse State University, Johnson City.

15. Matrix Analysis of Structures: a short course of two-hour sessions for structural design engineers and architects covering topics on matrix algebra, analysis of structures by force method, displacement of stiffness method, structural systems by linear graph theory and the use of digital computer on structural analysis; Memphis State University, Memphis.

16. Introduction to Data Processing: a seminar of ten two-hour sessions for supervisors in various industrial or business departments designed to develop within the participants a basic understanding about the "how" and "why" of computer operations and procedures; Memphis State University, Memphis.

17. Data Processing for Management: a seminar of ten two-hour sessions for top management personnel of firms which are operating computer facilities, are contemplating the procurement and implementation of such facilities, or are using computer services provided by others with course material designed to make management more knowledgeable about the capabilities of computer systems and the types of reports required to properly use a computer center so that full advantage is derived from costly equipment and staff; Memphis State University, Memphis.

18. Data Processing for Accountants: a course consisting of ten two-hour sessions specifically designed for accountants to improve their ability to work with computer-oriented business with such topics as record keeping on punched cards, magnetic tape and magnetic discs and applications of an integrated total system for accounting on a computer; Memphis State University, Memphis.

19. Computer Techniques for Management Problems: a two-day conference for upper level management on types of problems that can be solved with computers and information on new computer techniques with detailed information about the use of computers to improve managerial decision making; Memphis State University, Memphis.

20. Expanded Activities - Tennessee Industrial Research Advisory Service: a field service activity to identify specific business and industry problems and a referral service to bring specialized expertise and information to help solve these problems; University of Tennessee, Knoxville.

21. Administrative Services: activities necessary to administer the State Technical Services program including planning, developing, organizing and coordinating the Tenessee program and other activities relating to broad development of the State Technical Services program outside the state; Tennesse Industrial Research and Advisory Service, Nashville.

22. Value Analysis: sixteen two-hour weekly sessions for product designers, production supervisors, quality control personnel and others on the techniques of value analysis in the design and production of industrial products; Jackson State Community College, Jackson.

23. Safety Seminar: a one-day seminar for middle and top management personnel, product designers, directors of safety training and others on industrial safety concepts including related standards, economics and legislation; Jackson State Community College, Jackson.

24. Management Science with Fortran Programming: a series of ten two-hour lectures and five hours of computer laboratory work to present the use of computers in decision making and problem solving and the application of FORTRAN language for programming; Memphis State University, Memphis.

25. Quantitative Decision-Making: a twenty-hour short course for high-level management personnel on such topics as linear programming, inventory control techniques, simulation models and other tools for decision-making; Memphis State University, Memphis.

26. Computer Techniques for Management Problems: a two-day conference on the role of the computer in managerial decision-making, operational planning and control, including topics on systems analysis, operations research and simulation systems; Memphis State University, Memphis.

27. Detailing Concrete Structures: a concentrated short course on the new innovations in concrete design including thin-shell structures, hyperbolic paraboloids, domes and barrels, folded plates, pre-stress structures and geometric shapes in general; Memphis State University, Memphis.

28. Methods Time Measurement Workshop: a series of eight two-hour workshops for management and supervisory personnel, engineers and others on the MTM system for job evaluation in industrial operations; East Tennessee State University, Johnson City.

29. Fluid Power and Fluidics: a series of seven two-hour lectures and seven three-hour laboratory sessions on a wide range of topics and experiments in fluid power technology; Memphis State University, Memphis.

30. Quality Control by Statistical Methods: twelve two-hour sessions for industrial personnel at various levels on the practical application and use of statistical quality control, including such topics as frequency tabulations, stewart control charts and sampling acceptance plans; Memphis State University, Memphis.

31. Computer Graphics for Designers: fifteen two-hour sessions on the application of computer graphics to engineering design problems, including the present state of development, programming languages, graphical manipulation, systems analysis and future trends; Memphis State University, Memphis.

32. Work Measurement Seminar: a short course for supervisory personnel engaged in work measurement on the latest techniques and methods for measuring employee performance including basic stop watch methods, statistical methods and standard times, University of Tennessee at Martin.

33. PERT/CPM Seminar: a two-day seminar for supervisory and management personnel and foremen on the applications of PERT and CPM in the areas of construction and structural engineering; University of Tennessee at Martin.

34. Materials Handling Seminar: a two-day seminar by outstanding authorities in the area of materials handling on practical aspects and inplant adaptations of materials handling techniques; University of Tennessee at Martin.

TEXAS

1. Technical information Services to Industry in North Texas: a technical information center

designed to furnish on a request and fee basis, scientific and technological information deemed necessary to solve industry's needs, supplemented by monthly seminars on problem identification and how to effectively use the Center, special seminars for specific industry on information technology, and field liaison to provide direct contact with potential users of the service; Southern Methodist University, Dallas.

2. Short Courses on Technological Advances in Chemical Processing: a series of fourteen five-day short courses on thermodynamics, reactor engineering, distillation, process control, rheology and other phases of chemical processing designed to upgrade the petrochemical industries and their chemical engineers; Texas A & M University, College Station.

3. Acquainting Management of Manufacturing Companies with the Availability of Scientific and Technological Information: to acquaint management with the availability of technical information and the identification of needs by manufacturing companies; Texas A & M University, College Station.

4. Distribution of Scientific and Technical Information to the Petroleum Industry: six 2-week courses on petroleum reservoir engineering, advanced petroleum reservoir engineering and advanced drilling engineering for management and top level technical personnel combined with the design of an information center to serve the petroleum industry; Texas A & M University, College Station.

5. Catalogue of Research Facilities and Personnel in Texas: a referral service to provide management of industrial and other organizations with information on sources of research facilities and personnel that are available for their use in solving scientific and technical problems and to encourage Texas enterprises to use these resources; Texas A & M University, College Station.

6. Workshops and Seminars on Industrial Techniques: workshops and seminars designed to serve management of diversified business first on topics concerned with systems management work simplification, and work analysis; North Texas State University, Denton.

7. High Polymers of Industry: fifteen sessions three-hours each for chemical, plastics, structural and chemical engineers to acquaint industrial people with new types of plastic materials that may be profitably used as substitutes for their present materials; Texas Woman's University, Denton.

8. Southwest Urban Technology Conference: four two-day conferences, with a published proceedings, to exchange ideas between those engaged in the development of new technology for application in the urban environment and those decision-makers who must be aware of the new technology and its potential applications; Texas Christian University, Fortworth.

9. Administration: administration and coordination of the overall technical services program in the State of Texas; Texas College and University System Coordinating Board, Austin.

10. Time-Shared Computing and Its Applications: a one-week symposium designed to provide management personnel with background information and some working experience with time-shared computing, especially as related to the use of generalized data base systems; University of Texas, Austin.

UTAH

1. Program Management and Administration: performed by a qualified professional with responsibility for overall administration, coordination and evaluation of State Technical Services projects; participates directly in the promotion and execution of educational projects; maintains a master file of Utah industrial firms and provides industry referral service; University of Utah, Utah Industrial Services Agency, Salt Lake City.

2. Technical Field Services: conducted by a team of five qualified representatives with extensive technical and industrial experience who, through day-to-day contact with management personnel, translate technology into practical application by business and industry; University of Utah, Utah Industrial Services Agency, Salt Lake City.

3. Technical Information Retrieval & Dissemination Service: functions as a switching center between individual industrial firms and sources of technological data; includes publication of "Technology Announcements", abstracts and document reproduction; University of Utah, Utah Industrial Services Agency, Salt Lake City.

4. Institute for Technological Training: provides a program of evening courses in practical application of current technology related to computer science, electronics, industrial engineering and mechanical engineering to

develop skills which can be transferred directly to industrial applications; University of Utah, Division of Continuing Education, Salt Lake City.

5. Concrete and Concrete Materials Conference: a one-day conference for engineers, architects and managers from business and industry to introduce the latest methods of design, control and use of concrete as a structural material and directed toward the improvement and extension of uses of concrete as a construction material; Utah State University, Logan.

6. Numerical Control Seminar: a two-day seminar for managers of small manufacturing firms and job shops on the technological and economical advantages of numerical controlled metal working processes; Utah State University, Logan.

7. Introduction to Data Processing Concepts for Business: a 30-hour short course conducted over a period of three weeks in a series of 15 two-hour meetings to acquaint management personnel with techniques for using the computer as a tool for effective decision making within business; Weber State College, Ogden.

8. Credit Management Technology: a one-day conference for business managers and staff personnel to familiarize them with the use of computer science, statistical probability and current scientific approaches to credit management; Weber State College, Ogden.

9. Survey of Modern Control Systems: a short course consisting of weekly two-hour sessions for ten weeks to indoctrinate industrial managers, contractors and engineers in the basic principles and engineering techniques of modern control systems for a range of applications in the oil refining, steel milling, air conditioning, chemical processing, power plant, filtering and drying industries; University of Utah, Salt Lake City.

VERMONT

1. Field Counseling Service: provide field liaison with business and industry to uncover common technological problems that may be solved through direct application of existing technology, technical education or information; Norwich University, Northfield.

2. Manufacturing and Commercial Cost Monitoring: orient management to the use of cost data provided through a participative demonstration in real time by a computerized data system, thereby increasing profitability; Norwich University, Northfield.

3. Technical Information and Referral Center: assemble and disseminate scientific and technical information of value to Vermont industry, provide a directory of expertise for Vermont industry and business, and publish a newsletter on State Technical Services activities; University of Vermont, Burlington.

4. PERT/CPM Workshops: introduce to small firms and construction companies the value of utilizing PERT and CPM in programming work, through a four-day workshop offered twice; University of Vermont, Burlington.

5. State of the Art Series in Technology: a series of four symposiums on plastic design in steel, non-destructive testing, fluidics, and lasers for practicing industrial engineers; University of Vermont, Burlington.

6. New England Regional Program: Vermont portion of administration and implementation of a regional technical services program for the six New England States; New England Center for Continuing Education, Durham, New Hampshire.

7. Administration: administration, planning, and coordination of the overall technical services program for the State of Vermont; Vermont Development Department, Montpelier.

VIRGINIA

1. Operations Research: Concepts and Capabilities: a three-day seminar on operations research techniques for chief executives or their assistants in small business or division heads of larger companies: Lynchburg College, Lynchburg.

2. Data Systems, Science and Business: a three-day seminar on mathematical, statistical, and electronic characteristics of data systems for engineers, statisticians, systems analysts, and industrial managers; University of Richmond, Richmond.

3. Advanced Control System Design: a ten-day course on modern tools of control system analysis and design for engineers; University of Virginia, Charlottesville.

4. Applied Surface Chemistry: a five-day course on theory and practical applications of physical chemistry of surfaces for engineers and chemists; University of Virginia, Charlottesville.

5. Industrial Waste Control: a three-day conference on new and improved methods for

controlling industrial aid and water pollution for engineers and technical personnel; Virginia Military Institute, Lexington.

6. Finite Element Methods for Analyzing Structures: a five-day course on the application of finite element methods and associated computer techniques to the solution of structural problems Virginia Polytechnic Institute, Blacksburg.

7. Probability, Statistical Methods and Decision-Making Short Course: A five-day course on those aspects that are applicable to solving industrial problems; Virginia Polytechnic Institute, Blacksburg.

8. Introduction to Computer Programming Short Course: introductory one-week course for practicing engineers in digital computer programming with engineering applications; Virginia Polytechnic Institute, Blacksburg.

9. Logical Design of Digital Circuits Short Course: a five-day course to present to practicing engineers techniques for the design of switching circuits and digital systems; Virginia Polytechnic Institute, Blacksburg.

10. Forest Products Utilization Service: disseminate new technology to the wood-using industries through information and reference services, demonstrations, and technical assistance; Virginia Polytechnic Institute, Blacksburg.

11. Technical Services for Marine-Resource Based Industry: develop an information gathering and retrieval service and disseminate technical information of use to marine-resource based industry; College of William and Mary, Charlottesville.

12 Field Service Program: provide a field service program to afford technical services to firms, and ascertain the needs of industry, with the following institutions participating: Old Diminion College, University of Virginia, Virginia Military Institute, Virginia Polytechnic Institute, Charlottesville.

13. Administration: administration, planning, and coordination of the overall technical services program for the Commonwealth of Virginia, Virginia Polytechnic Institute, Blacksburg.

VIRGIN ISLANDS

1. Up-Grading and Instruction for Engineers, Architects and Building Contractors: twelve seminars conducted by mainland, Puerto Rico and local expertise to update engineers, architects and building contractors in new technologies, such as, desalinization processes, concrete mixes especially designed for local use, waste disposal, and other subject material selected by an advisory committee of local engineers and scientistis, College of the Virgin Islands, St. Thomas.

2. Dissemination of Advanced Technology to the Printing Industry: field service project designed to expose the local printing industry on St. Thomas and St. Croix to the latest technological advances in the graphic arts; College of the Virgin Islands, St. Thomas.

3. Technical Information Center: a collection of research information of interest to top management personnel of local industry and business and available on loan with dissemination of selected advanced technological information directly to those businesses which have indicated a special interest; College of the Virgin Islands, St. Thomas.

4. The Design of Man's Physical Environment through the Technology of Landscape Architecture: two workshops of two days each, one at St. Thomas and the other at St. Croix, to encourage a more effective use of landscape architecture technology to the design, engineering, and building professions with the development of a comprehensive manual on the subject matter; College of the Virgin Islands, St. Thomas.

5. Lasers and Their Potential Technical Applications to Local Business and Industry: two half-hour television presentations covering the physics and operation of the laser and a demonstration of laser applications; College of the Virgin Islands, St. Thomas.

6. Latest Technological Development on the Ground Handling of Aircraft: a one-day workshop, directed to top and middle level supervisory personnel on technological developments in aircraft refueling methods, automated baggage handling techniques, and passenger disembarkation and movement; College of the Virgin Islands, St. Thomas.

WASHINGTON

1. Program Administration: performed by a qualified professional with responsibility for overall administration, coordination and evaluation of State Technical Services projects; Department of Commerce and Economic Development, Olympia.

2. Technical Reference Center: a central reference center for technical information, assistance and referral to sources of expertise for forest products and other industries; includes quarterly publication of a technical newsletter; Department of Commerce and Economic Development, Olympia.

3. Data Processing Institute: an eight-session seminar for management personnel on the applications of modern control systems and improved application of modern technologies by business and industry; Eastern Washington State College, Cheney.

4. Electronic Instrumentation: an eight-session short course for engineers, scientists and technicians on recent developments in solid-state electronic devices and the applications of such devices to measurement and control; Gonzaga University, Spokane.

5. Digital Computer Technology: an eight-session short course for both management and technical personnel on recent developments in computer technology and potential applications of digital computation in their work; Gonzaga University, Spokane.

6. Technical Information Retrieval: a six-session workshop to introduce engineers and scientists to the methods and facilities for retrieving technical information; Gonzaga University, Spokane.

7. Technical Reference Library: a central library providing broad-based technical reference material to business and industrial managers, scientists and engineers; Gonzaga University, Spokane.

8. Polymer Science and Technology Library: Gathering of a highly articulate collection of basic polymer reference works to provide chemists a wide range of literature on polymer science and technology; Pacific Lutheran University, Tacoma.

9. Probability Fundamentals and Engineering Applications: a short course to increase the competence of engineers in applying mathematical disciplines of probability and statistics to quality control and reliability; University of Washington, Seattle.

10. Publication and Distribution of Scientific and Technical Information to Forest Products Industry: a new series of publications to interpret for foresters, wood technologists, and research personnel new scientific research in terms of its application within the forest products industry; University of Washington, Seattle.

11. Forest Resources: a series of four five-day short courses and one-half day seminars to acquaint foresters and resource managers with the latest technology in the forest sciences; University of Washington, Seattle.

12. Radiation Applications and New Processes: a series of three seminars and one short course to carry out demonstration projects to expedite the use of available technology in commercial irradiation of foods and other related products; University of Washington, Seattle.

13. Radiation of Fisheries and Agricultural Products: dissemination of information concerning application of radiation to the food and related industries through television appearances, mail correspondence, small group demonstrations, literature distribution and speeches to service organizations, students and professional societies; University of Washington, Seattle.

14. Techniques Involved in Food Irradiation: a four-day short course for management, quality control, operations and research personnel to upgrade the technological capabilities of the food processing industry through an awareness of the latest food processing technology including processing foods by ionizing radiation; University of Washington, Seattle.

15. Dissemination of Oceanographic Information: a series of ten thirty-minute television programs to disseminate information on current oceanographic research to business and technical groups within oceanography-related business concerns; University of Washington, Seattle.

16. Short Courses, Workshops and Technical Conferences: a series of nine sessions to disseminate the latest engineering information and technical developments on nondestructive testing of wood, plastics technology, particleboard technology, radioisotopes, analog computers, electronics, vibration and acoustics, lighting and two-way mobile communications to small industrial concerns and farm operators; Washington State University, Pullman.

17. A Guide to Radioisotope Applications: preparation and publication of a guide of radioisotope applications to stimulate further development of industries based upon nuclear energy data and related technical information; Washington State University, Pullman.

WEST VIRGINIA

1. Field Implementation Service: technical representative to visit firms and assist with

identification of technical problems and interpretation of available pertinent information, and also generally acquaint business and industry with relevant technological advances and applications, with special attention to areas III and IV of State; West Virginia Department of Commerce, Charleston.

2. Technical Information Service: review, abstract and interpret applicable scientific and technical information for business and industry; respond to requests for technical information and produce and distribute a newsletter on State Technical Services; West Virginia Department of Commerce, Charleston.

3. Technical Reference Service: a state-wide reference service to assist industries in locating sources of scientific professional, engineering and technical expertise and technical information, with special attention to areas III and IV of State; West Virginia Department of Commerce, Charleston.

4. Field Implementation Service: field representative to visit firms and assist with identification of technical problems and interpretation of available pertinent information, and also generally acquaint business and industry with relevant technological advances and applications; serves West Virginia Area II; West Virginia University, Morgantown.

5. Technical Information Center: review, abstract and interpret applicable scientific and technical information for business and industry, respond to requests for technical information and perform searches, retrieval and dissemination; serves West Virginia Area II; West Virginia University, Morgantown.

6. Technical Reference Service: assist West Virginia Department of Commerce in identifying sources of expertise and in developing reference materials which will assist industry in locating sources of scientific and technical information; West Virginia University, Morgantown.

7. Field Implementation Services: Field representative to visit firms and assist with identification of technical problems and interpretation of available pertinent information, and also generally acquaint business and industry with relevant technological advances and applications, serves West Virginia Area I; Technical Consultants, Inc., Huntington.

8. Technical Information Center: perform searches, retrieval and dissemination of technical information, or provide requester with probable sources of requested information; also assist designated agency and other participating institutions in information searches, on request; serves West Virginia Area I; Technical Consultants, Inc., Huntington.

9. Symposium on the Use of Isotopes in Industry and Medicine: a two-day symposium to provide management and supervisory personnel with an understanding of the principles of using isotopes in steel, aluminum, ferro alloys, power, oil, gas, printing, glass and ceramic industries; Wheeling College, Wheeling.

10. Symposium on Glass Technology: a two-day symposium for management and supervisory personnel on new technology in hand glass making to enable the hand glass industry to keep pace with new developments; Wheeling College, Wheeling.

11. Administration: administration, planning, and coordination of the overall technical services program for the State of West Virginia; West Virginia Department of Commerce, Charleston.

WISCONSIN

1. Administration of the State Technical Services Program: performed by a qualified staff of professionals with responsibility for coordination and administration of the state-wide program; University of Wisconsin University Extension, Madison.

2. Information Dissemination Service: uses University of Wisconsin library resources coupled with external sources of information including NASA/TU, AEC and CFSTI; supports regional information center in Milwaukee; University of Wisconsin, University-Industry Research Program, Madison.

3. Technical Services Newsletter: a newsletter serving business, industry, and commerce with news of past events, a calendar of courses and meetings, and advanced state-of-the-art items in summary form; University of Wisconsin, University Extension, State Technical Services, Madison.

4. New Technology Briefings: a series of statewide conferences serving business, commerce, and industry on new advances in industrial technology, including powdered metallurgy, advances in machining new alloys, adhesives of joining, computers in engineering design, and advances in wood products and food processing: University of Wisconsin, Madison.

5. Educational Program: an extensive program of fifty-nine separate activities in the form of short courses, workshops and seminars designed for business and industry on such topics as microwave solid-state devices, optics, computer applications, communications engineering, welding, ceramics, manufacturing methods, microminiaturization, numerical control, reinforced concrete and work sampling and value engineering; University of Wisconsin, Madison and Marquette University, Milwaukee.

6. Field Services: a program designed to provide industry with local contacts and a wide range of technical competence on technical, educational, and information retrieval problems; University of Wisconsin, Madison.

7. Food Technology Conferences: two one day conferences on the application of computers to process control, inventory control, quality control and management information systems, and on new developments in food transportation, packaging, processing and production; University of Wisconsin, Madison.

8. Audio Tapes on New Technology: a series of regular five-minute news briefs and half-hour interviews of technical interest to industrial managers and technical personnel; University of Wisconsin, Madison.

9. Chemical Instrumentation: a video tape technical assistance course for chemists, chemical engineers, and technicians on modern instrumental techniques and method of analysis and use of the data obtained; University of Wisconsin, Madison.

WYOMING

1. Administration and General Services: performed by a qualified professional with responsibility for overall administration, coordination and evaluation of State Technical Services projects; participates directly in the promotion and execution of educational programs; University of Wyoming, Laramie.

2. Field Advisory and Referral Services: personal contact with businessmen and industrial establishments to develop technical information needs, capabilities and sources of expertise for referral on technical problems and other forms of assistance; University of Wyoming, Laramie.

3. Computer Applications Conference: a series of three one day conferences on the applications of computers, operations research techniques, systems analysis and EDP equipment in the mining and mineral industries, commercial banks and business firms; University of Wyoming, Laramie.

4. Concrete Technology Conference: a two-day conference and field demonstration dealing with technical development in the use of concrete for construction, design of concrete structures and future applications for contractors, batch plant operators and architects; University of Wyoming, Laramie.

5. Technical Information Conference: a series of four one day conferences for management representatives of business and industrial firms on the available sources of technical information and assistance including Federal and State agencies; University of Wyoming, Laramie.

6. Wood Drying Conference: a one day conference for wood processing and wood product firms engineers, architects and builders on recent developments in wood drying, including air drying versus kiln drying, wood properties at various moisture contents, and economic considerations; University of Wyoming, Laramie.

7. Technical Information and Reference Center: personal contact with industrial firms and businessmen including referral to identified sources of information, publication of a monthly information bulletin, provision for abstracting of materials, bibliographic searches, acquisitions and reproduction of requested materials, and a survey of technical information needs and interests, utilizing facilities of the Laramie County Library; University of Wyoming, Laramie.

8. Continuing Technology Education Programs: a continuing series of technology education conferences, seminars and short courses for technical, managerial and professional groups to provide prompt and timely response to the technological needs of Wyoming business and industry; University of Wyoming, Laramie.

Table VIII, below, furnishes a detailed analysis of the distribution of approved projects and the Federal matching funds in support of the several categories of technical service activity as compiled from the 46 State programs approved for fiscal year 1968.

Table VIII - Federal Matching Funds by Category of Technical Services
(State Programs Division - Fiscal Year 1968)

Category	Projects	Percent	Dollars	Percent
Administration	58	7.8	498,291	11.2
Conferences, Seminars	482	64.7	1,260,645	28.3
Information Services .	90	12.1	1,148,386	25.8
Referral Services ...	39	5.2	403,045	9.0
Field Services	68	9.1	984,037	22.1
Demonstrations	8	1.1	158,604	3.6
Totals	745	100.0	4,453,008	100.0

Index of Technologies and Continuing Technical Services Presented Through STS Projects

This index lists the projects of fiscal year 1968 State Technical Services programs by project numbers and pages under the particular technologies or types of technical services presented through those projects. The number preceding the name of a State refers to the project number within the State technical services program as used in this appendix. The number following each entry by States refers to the page of this appendix wherein a brief description of the project can be found.

Acoustics (Noise Abatement)

8. Oklahoma, 25
17. Washington, 36

Adhesives

10. Georgia, 7
24. Michigan, 15
4. Wisconsin, 37

Aerospace Industry

28. New York, 23
7. Ohio, 24

Airports (Operations)

3. Missouri, 16
6. Virgin Islands, 35

Agriculture—Related Industry

6. Louisiana, 11
4. Nebraska, 19
14. Washington, 36

Air Pollution Abatement

4. California, 4
22. Iowa, 9
14. Michigan, 15
7. Minnesota, 16
5. Montana, 18
19. New York, 22
35. New York, 23
9. Rhode Island, 29

Apparel Industry (Garments)

6. Alabama, 1

Architecture (Architects)

4. New Mexico, 21
8. Oklahoma, 25

Architecture—Con.

1. Virgin Islands, 35
4. Virgin Islands, 35
4. Wyoming, 38

Automatic Controls (Automation)

6. Illinois, 8
6. Virgin Islands, 35

Building Materials

21. Michigan, 15
7. Ohio, 24
8. Oklahoma, 25
3. Tennessee, 30
5. Utah, 34
1. Virgin Islands, 35
5. Wisconsin, 38
4. Wyoming, 38
17. Washington, 36

Capital Formation

7. Connecticut, 5
9. New Mexico, 21

Carbon and Graphite

4. Pennsylvania, 27

Ceramics

6. California, 4
5. Wisconsin, 38

Chemical Engineering

2. Alabama, 1
10. Michigan, 14
8. Missouri, 16
5. Montana, 18
39. New York, 23
9. Tennessee, 31
7. Texas, 33
4. Virginia, 34
9. Wisconsin, 38

Chemicals (Allied Products)

5. Missouri, 16
9. Missouri, 16
23. Oklahoma, 26
11. Tennessee, 31
9. Utah, 34

Civil Engineering

3. Kentucky, 11
3. Maine, 13
1. Montana, 17
4. Montana, 18
3. New Hampshire, 20
18. Oklahoma, 26

Communications

6. California, 4
16. Michigan, 15
2. Missouri, 16
17. Washington, 36
5. Wisconsin, 38

Computer Analog

5. Illinois, 8
12. Louisiana, 12
13. Louisiana, 12
17. Washington, 36

Computer Applications

8. Arizona, 2
6. Arkansas, 3
9. Arkansas, 3
3. District of Columbia, 6
2. Georgia, 6
1. Illinois, 8
5. Illinois, 8
15. Iowa, 9
16. Iowa, 9
17. Iowa, 9
18. Iowa, 9
19. Iowa, 9

Computer Applications—Con.

3. Kentucky, 11
2. Maine, 13
5. Louisiana, 11
10. Louisiana, 12
12. Louisiana, 12
13. Louisiana, 12
15. Louisiana, 12
16. Louisiana, 12
17. Louisiana, 12
21. Louisiana, 12
2. Maine, 13
7. Maine, 13
10. Michigan, 14
11. Michigan, 14
16. Michigan, 15
19. Missouri, 17
22. Missouri, 17
1. Montana, 17
6. Montana, 18
7. Montana, 18
12. Nebraska, 19
3. New Hampshire, 20
4. New Hampshire, 20
25. New York, 23
28. New York, 23
40. New York, 23
42. New York, 23
6. Oklahoma, 25
7. Oklahoma, 25
19. Pennsylvania, 28
4. Puerto Rico, 28
3. Rhode Island, 29
11. Tennessee, 31
15. Tennessee, 31
19. Tennessee, 32
26. Tennessee, 32
6. Virginia, 35
5. Wisconsin, 38
3. Wyoming, 38
4. Utah, 33
5. Washington, 36
4. Wisconsin, 37

Computer Programming

2. Alabama, 1
7. Missouri, 16
18. Missouri, 17
8. Virginia, 35

Computer Programming—Fortran

2. Georgia, 6
9. Louisiana, 12
24. Tennessee, 32

Computer—Real Time

2. Vermont, 34

Computer Service

1. Illinois, 8

Computer Software

13. New Mexico, 21
31. Tennessee, 32

Computer — Time Sharing

16. Michigan, 15
12. Nebraska, 19
8. New Hampshire, 20
5. New Mexico, 21
10. Texas, 33

Construction Industry

7. Arizona, 2
11. Arizona, 2
2. District of Columbia, 6
4. District of Columbia, 6
1. Illinois, 8
4. Louisiana, 11
21. Michigan, 15
4. New Mexico, 21
27. Tennessee, 32
1. Virgin Islands, 35

Controls, Industrial

3. Alabama, 1

Control Theory & Systems

16. Michigan, 15
7. Missouri, 16
19. New York, 22
7. Tennessee, 30
9. Utah, 34
3. Washington, 36
3. Virginia, 34

Corrosion Control

5. Maine, 13

Cost Control

19. Iowa, 9
2. Maine, 13
7. Minnesota, 16
5. Oklahoma, 25
21. Oklahoma, 26
1. Puerto Rico, 28
3. Puerto Rico, 28
2. Vermont, 34

CPM/Pert Techniques

9. Arkansas, 3
4. District of Columbia, 6
1. Illinois, 8
9. Iowa, 9
28. Iowa, 10
3. Maine, 13
3. Michigan, 14
8. Nebraska, 19
7. Nevada, 20
5. New Hampshire, 20
10. New Mexico, 21
2. Oklahoma, 25
6. Oklahoma, 25
9. Oklahoma, 25
13. Oklahoma, 25
1. Puerto Rico, 28
6. Tennessee, 30
33. Tennessee, 32
4. Vermont, 34

Data Base Systems

10. Texas, 33
2. Vermont, 34
2. Virginia, 34

Data Processing

10. Iowa, 9
19. Iowa, 9
25. Iowa, 16
2. Michigan, 14
17. Michigan, 14
4. Missouri, 16
1. Oklahoma, 25
21. Oklahoma, 26
16. Tennessee, 31
17. Tennessee, 31
18. Tennessee, 31
7. Utah, 34
3. Washington, 36

Decision Making

2. Georgia, 6
9. Georgia, 7
18. Iowa, 9
2. Maine, 13
7. Montana, 18
13. Oklahoma, 25
25. Tennessee, 32
26. Tennessee, 32
7. Utah, 34
7. Virginia, 35

Demonstration Services

3. Georgia, 7

Design Concepts

11. Rhode Island, 29
27. Tennessee, 32

Design Engineering

4. Kansas, 10
7. Maine, 13
19. Missouri, 17
6. Nebraska, 19
5. Nevada, 19
25. New York, 23
40. New York, 23
7. Ohio, 24
6. Oklahoma, 25
3. Tennessee, 30
9. Tennessee, 31
31. Tennessee, 32
9. Virginia, 35
4. Wisconsin, 37

Desalinization

1. Virgin Islands, 35

Direct Mail Service

2. Alaska, 1
8. Colorado, 5
12. Iowa, 9
14. Iowa, 9
3. Kansas, 10
1. Nevada, 19
2. Nevada, 19
2. Ohio, 24
2. Washington, 36
2. West Virginia, 37
3. Wisconsin, 37

Directories of Expertise

5. Alabama, 1
2. Colorado, 4
1. District of Columbia, 6
1. Georgia, 6
2. Kansas, 10
1. Michigan, 13
20. Michigan, 15
5. Minnesota, 16
15. Missouri, 17
11. Montana, 18
8. New Mexico, 21
9. Puerto Rico, 28
3. South Carolina, 29
5. Texas, 33

Educational Television

3. Alabama, 1
2. California, 4
10. Colorado, 5
3. Connecticut, 5

Educational Television—Con.

1. Kentucky, 11
25. Michigan, 15
5. Virgin Islands, 35
16. Washington, 36

Electrical Engineering

19. Michigan, 15

Electronics

3. Colorado, 4
6. Maine, 13
6. Nevada, 19
28. New York, 23
8. Puerto Rico, 28
4. Utah, 33
4. Washington, 36
17. Washington, 36

Engineering Education

13. Missouri, 17

Entrepreneurship

7. Connecticut, 5
5. Kansas, 10
7. Missouri, 16
4. Nevada, 19

Evaluation

9. Georgia, 7
10. Nevada, 20

Field Services

1. Alaska, 1
2. Arizona, 2
1. Arkansas, 2
3. Colorado, 4
4. Colorado, 5
5. Colorado, 5
2. Connecticut, 5
2. Delaware, 6
6. Georgia, 7
1. Kansas, 10
9. Kansas, 10
8. Maine, 13
7. Massachusetts, 13
1. Michigan, 13
2. Minnesota, 16
16. Missouri, 17
17. Missouri, 17
5. Montana, 18
9. Nebraska, 19
3. Nevada, 19
1. New Hampshire, 20

Field Services—Con.

3. New Mexico, 21
4. New York, 22
10. New York, 22
27. New York, 23
30. New York, 23
2. North Carolina, 24
17. Oklahoma, 26
19. Oklahoma, 26
5. Oregon, 27
8. Oregon, 27
10. Oregon, 27
6. Puerto Rico, 28
6. Rhode Island, 29
1. South Carolina, 29
2. South Dakota, 30
20. Tennessee, 32
2. Utah, 33
1. Vermont, 34
12. Virginia, 35
1. West Virginia, 36
4. West Virginia, 37
7. West Virginia, 37
6. Wisconsin, 38
2. Wyoming, 38
3. Texas, 33

Film Services (tapes)

4. Alabama, 1
3. North Carolina, 24

Fire Safety

7. Georgia, 7
4. Michigan, 14
7. Ohio, 24

Fishing Industry

8. Oregon, 27
8. Puerto Rico, 28
1. Rhode Island, 29
14. Washington. 36

Fluid Mechanics

21. Missouri, 17
24. Missouri, 17
2. Tennessee, 30
29. Tennessee, 32
5. Vermont, 34

Food Technology

1. Louisiana, 11
15. Michigan, 15
13. Montana, 18
16. New York, 22
14. New York, 22
15. New York, 22

Food Technology—Con.

9. Oregon, 27
5. Rhode Island, 29
15. Washington, 36
4. Wisconsin, 37
7. Wisconsin, 38

Forestry

11. Michigan, 14
9. Montana, 18
8. Montana, 18
24. New York, 23
19. New York, 22
10. Oregon, 27
11. Washington, 36

Furniture

7. Georgia, 7
10. Georgia, 7

Geologists (Environment)

7. New Mexico, 21
15. New Mexico, 21
36. New York, 23
16. Oklahoma, 26

Glass Technology

10. West Virginia, 37

Hydraulics

4. Montana, 18
8. Nevada, 20
14. New Mexico, 21
2. Tennessee, 30

Industrial Engineering

3. Minnesota, 16
16. Missouri, 17
5. Nebraska, 19
11. New Mexico, 21
4. South Dakota, 30
5. Vermont, 34
4. Utah, 33

Industrial Safety

12. Arkansas, 3
23. Tennessee, 32

Information & Analysis Center

4. Kentucky, 11
9. Puerto Rico, 28
3. California, 4

Information Sciences

2. Alabama, 1
6. California, 4
21. Iowa, 9
15. Louisiana, 12
6. Montana, 18
1. New York, 21
7. Oklahoma, 25
3. Texas, 33
5. Wyoming, 38
6. Washington, 36

Information Services

6. Alabama, 1
2. Arizona, 2
14. Arkansas, 4
3. California, 4
1. Colorado, 4
5. Connecticut, 5
1. Delaware, 6
1. Hawaii, 7
12. Iowa, 9
14. Iowa, 9
5. Kansas, 10
3. Kansas, 10
6. Louisiana, 11
14. Louisiana, 12
1. Maine, 12
1. Massachusetts, 13
1. Michigan, 13
4. Minnesota, 16
2. Nevada, 19
1. New Hampshire, 20
2. New Mexico, 20
1. New York, 21
17. New York, 22
11. New York, 22
22. New York, 22
21. New York, 22
34. New York, 23
26. New York, 23
4. North Carolina, 24
5. Ohio, 24
3. Ohio, 24
6. Ohio, 24
19. Oklahoma, 26
24. Oklahoma, 26
9. Oregon, 27
7. Oregon, 27
4. Pennsylvania, 27
1. Pennsylvania, 27
5. Pennsylvania, 27
5. Rhode Island, 29
1. Rhode Island, 29
10. Rhode Island, 29
4. South Dakota, 30
1. Texas, 32
3. Utah, 33
3. Virgin Islands, 35

Information Services—Con.

3. Vermont, 34
2. Washington, 36
8. West Virginia, 37
5. West Virginia, 37
2. West Virginia, 37
2. Wisconsin, 37

Inventions

3. South Carolina

Instrumentation

3. Alabama, 1
6. Maine, 13
6. Michigan, 14
7. Missouri, 16
10. Missouri, 16
11. Missouri, 17
7. Ohio, 24
1. Tennessee, 30
4. Tennessee, 30
4. Washington, 36
9. Wisconsin, 38

Inventory Control (Management)

2. Georgia, 6
9. Georgia, 7
5. Louisiana, 11
22. Missouri, 17
5. Nebraska, 19
3. Oklahoma, 25
13. Oklahoma, 25
21. Oklahoma, 26
3. Puerto Rico, 28
1. Puerto Rico, 28
8. Tennessee, 31
25. Tennessee, 32

Lasers

6. California, 4
7. Ohio, 24
5. Vermont, 34
5. Virgin Islands, 35

Library Services

7. California, 4
1. Colorado, 4
4. Connecticut, 5
2. Hawaii, 7
7. Kansas, 10
2. Kentucky, 11
21. Michigan, 15
4. Minnesota, 16
6. Minnesota, 16
8. New York, 22
1. North Carolina, 24

Library Services—Con.

19. Oklahoma, 26
24. Oklahoma, 26
2. Oregon, 27
2. Pennsylvania, 27
6. Pennsylvania, 27
7. Puerto Rico, 28
1. Texas, 32
7. Washington, 36
8. Washington, 36
2. Wisconsin, 37
7. Wyoming, 38

Linear Programming

9. Georgia, 7
18. Iowa, 9
11. Iowa, 9
2. Oklahoma, 25
13. Oklahoma, 25
25. Tennessee, 32

Logic

9. Virginia, 35

Maintenance

10. New Mexico, 21
10. Oklahoma, 25
1. Puerto Rico, 28

Management Technology

8. Alabama, 1
3. Arizona, 2
4. Arizona, 2
10. Arizona, 2
2. Louisiana, 11
10. Louisiana, 12
5. Louisiana, 11
5. North Carolina, 24
2. Oklahoma, 25
3. Puerto Rico, 28
3. Rhode Island, 29
24. Tennessee, 32

Marketing

4. Rhode Island, 29

Materials Handling (Control)

1. Alabama, 1
17. Michigan, 15
10. Nebraska, 19
3. Puerto Rico, 28
5. Tennessee, 30
34. Tennessee, 32

Materials Technology

7. Arkansas, 3
2. California, 4
2. District of Columbia, 6
3. Massachusetts, 13
7. Minnesota, 16
12. Missouri, 17
6. New Hampshire, 20
7. Ohio, 24
3. Pennsylvania, 27
5. Pennsylvania, 27
5. Utah, 34

Matrix Methods

8. Arkansas, 3
15. Tennessee, 31

Measurement

9. Michigan, 14
1. Tennessee, 30
2. Tennessee, 30
4. Washington, 36

Mechanical Engineering

7. Maine, 13
4. Utah, 33

Metallurgy

5. Connecticut, 5
1. Pennsylvania, 27
9. Utah, 34
4. Wisconsin, 37

Metal Removal (Machining)

7. Michigan, 14
22. Michigan, 15
20. Missouri, 17
5. Ohio, 24
4. Wisconsin, 37

Metals Technology

7. Alabama, 1
6. California, 4
5. Connecticut, 5
6. Connecticut, 5
7. Michigan, 14
3. Nebraska, 18
19. New York, 22
1. Pennsylvania, 27
7. Rhode Island, 29
6. Utah, 34

Meteorology

11. Pennsylvania, 28

Methods Improvement

7. Iowa, 9
8. Louisiana, 12
23. Missouri, 17
3. Oklahoma, 25
11. Oklahoma, 25
3. Puerto Rico, 28

Microwave Technology

5. Wisconsin, 38

Minerals and Mining

2. Alaska, 1
6. Colorado, 5
10. Montana, 18
3. Nevada, 19
3. Wyoming, 38

Motion & Time Study

2. Iowa, 8
7. Iowa, 9
22. Louisiana, 12
3. Oklahoma, 25
5. Oklahoma, 25
2. Puerto Rico, 28
28. Tennessee, 32
32. Tennessee, 32

Networks Analysis

6. Nebraska, 19

Nuclear Technology

7. New York, 22
6. New York, 22
5. New York, 22
32. New York, 23
3. Oregon, 27
2. Oregon, 27

Numerical Analysis and Method

4. Oklahoma, 25

Numerical Control

6. Illinois, 8
7. Michigan, 14
18. Michigan, 15
7. Ohio, 24
6. Utah, 34
5. Wisconsin, 38

Oceanography

6. California, 4
28. New York, 23

Oceanography—Con.

32. New York, 23
1. Rhode Island, 29
11. Virginia, 35
16. Washington, 36

Operations Research

1. Alabama, 1
3. Georgia, 7
2. Iowa, 8
8. Iowa, 9
7. Missouri, 16
2. Oklahoma, 25
13. Oklahoma, 25
13. Tennessee, 31
26. Tennessee, 32
1. Virginia, 34

Optics

5. Wisconsin, 38

Optimization Methods

11. Louisiana, 12
4. Oklahoma, 25
6. Oklahoma, 25
9. Oklahoma, 25
13. Oklahoma, 25

Packaging

7. Arkansas, 3
3. California, 4
23. Oklahoma, 26

Petrochemicals

2. Texas, 33

Petroleum

3. Texas, 33
9. Utah, 34

Pharmaceutical Technology

3. Iowa, 8
22. Oklahoma, 26
2. Rhode Island, 29
8. Rhode Island, 29

Photographic Technology

2. Illinois, 8

Plant Layout Development

1. Alabama, 1
4. Arkansas, 3
5. Oklahoma, 25
3. Puerto Rico, 28

Plastic Technology

8. Iowa, 9
13. Michigan, 15
4. Michigan, 14
24. Michigan, 15
23. Michigan, 15
9. Missouri, 16
32. New York, 23
9. Tennessee, 31
7. Texas, 33
5. Vermont, 34
8. Washington, 36
17. Washington, 36

Pneaumatics

2. Tennessee, 30

Printing and Graphic Arts

9. Arizona, 2
10. Kansas, 10
9. Kansas, 10
5. Michigan, 14
32. New York, 23
7. Ohio, 24
31. Tennessee, 32
2. Virgin Islands, 35

Process Control

2. Alabama, 1
9. New York, 22
11. Tennessee, 31
2. Texas, 33

Production Planning & Control

9. Colorado, 5
23. Iowa, 9
5. Nebraska, 19
3. Oklahoma, 25
3. Puerto Rico, 28
1. Tennessee, 30

Profiles, Interest

8. Kansas, 10
2. Nebraska, 18
4. Oregon, 27
2. South Carolina, 30

Purchasing Technology

8. Michigan, 14
6. Oklahoma, 25

Quality Control

5. Arkansas, 3
2. Illinois, 8

Quality Control--Con.

20. Iowa, 9
3. Louisiana, 11
20. Louisiana, 12
7. Minnesota, 16
5. New Hampshire, 20
3. Oklahoma, 25
23. Oklahoma, 26
3. Puerto Rico, 28
7. Tennessee, 30
30. Tennessee, 32
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5. California, 4
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2. Texas, 33

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2. Alaska, 1
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5. Alabama, 1
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1. Massachusetts, 13
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6. Oregon, 27
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8. Connecticut, 5
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7. Connecticut, 5
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1. California, 4

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26. Missouri, 17
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6. District of Columbia, 6
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8. District of Columbia, 6
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3. Arkansas, 3
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9. Alabama, 1
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3. District of Columbia, 6
3. Maine, 13
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STS Administration

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1. Arizona, 2
2. Arkansas, 2
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8. California, 4
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3. Hawaii, 8
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3. Delaware, 6
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Thermal Analysis

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2. Texas, 33

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2. Alabama, 1
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5. District of Columbia, 6
11. Kansas, 11
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8. Michigan, 14
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7. Minnesota, 16
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5. Arizona, 2
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6. Iowa, 8
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Water Pollution (Abatement)—Con.

4. Massachusetts, 13
14. Michigan, 15
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4. Iowa, 8
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Welding Technology

13. Arkansas, 3
11. Nebraska, 19
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Wood Technology

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1. Alabama, 1
4. California, 4
6. California, 4
3. Georgia, 7
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3. Illinois, 8
4. Maine, 13
22. Michigan, 15
12. Michigan, 15
22. New York, 22
21. New York, 22
10. Virginia, 35
2. Washington, 36
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4. Wisconsin, 37
6. Wyoming, 38

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2. Puerto Rico, 28
7. Tennessee, 30
32. Tennessee, 32
6. Texas, 33

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